



**ACTUARIAL METHODS FOR IMPROVING  
HCFA PAYMENTS TO RISK HMOS**

**FINAL REPORT**

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## Executive Summary

The Medicare risk contracting program serves approximately 3.2 million Medicare eligibles who are enrolled in 194 health maintenance organizations (HMOs) and competitive medical plans (CMPs). Medicare pays participating HMOs and CMPs according to the Adjusted Average Per Capita Cost (AAPCC) payment methodology, which has been used since the beginning of the Medicare risk program. The AAPCC payment method is based on 95 percent of the estimated cost that Medicare HMO enrollees would have experienced if they had remained in the fee-for-service sector.

The limitations of the AAPCC payment method are well-known. The AAPCC explains less than one percent of the variance in per capita Medicare costs for aged beneficiaries.<sup>1</sup> From HCFA's perspective, the AAPCC is responsible for negative program savings because it does not compensate for the favorable selection of healthier-than-average persons being enrolled in HMOs.<sup>2</sup> From the HMO perspective, the AAPCC is based on fee-for-service data and does not adequately reflect HMO practice patterns or cost experience. Thus, many observers believe that the AAPCC is at least partly responsible for the lack of HMO participation (less than 40 percent of existing HMOs have Medicare risk contracts).<sup>3</sup>

The purpose of this study was to evaluate four alternative payment methods for risk HMOs: (1) reinsurance, (2) select and ultimate rates, (3) partial capitation and blended rates, and (4) experience rating. Reinsurance methods provide protection to participating health plans against the cost of high-cost cases and catastrophic expenses. Methods using select and ultimate rates take into account the regression to the mean phenomenon and other trends in health care costs over time. Partial capitation methods place health plans at risk for less than 100 percent of the full capitation amount by covering selected services (physician services, Part B services, etc.) or by other defined coverage or risk-sharing arrangements. Experience rating approaches are based on the prior cost experience of the health plan and can involve



prospective, retrospective or mixed methods. A payment system based on experience rating can be viewed as a form of risk adjustment system.

### Approach and Methods

To evaluate alternative payment methods for HMOs participating in the Medicare risk program, a simulation model was used to develop predicted group means. The accuracy and reliability of the estimated payments were the standards for validation. The approach and methods used in the study are summarized as follows:

1. Analysis of Groups. Much previous work on analysis of Medicare payment methods for risk HMOs has focused on the accuracy and goodness-of-fit of alternative payment methods in predicting actual costs at the individual level. For this study, however, the appropriate criterion is how well a payment method predicts costs for groups, not individuals. Thus, this study has concentrated on analysis of alternative payment methods at the group level, where groups correspond to potential HMO enrolled populations.
2. Data Sources. Given the concerns over the appropriateness of basing HMO payment rates on fee-for-service data, this study has used two major sources of data: (1) fee-for-service data for 1987-1992 from the Continuous Medicare History Sample (CMHS), and (2) HMO-based data for 1990-1992 from a plan serving a large Medicare population. All of the statistical results are calculated using both sets of data.
3. Simulation Methods. A simulation model was developed to analyze and evaluate the alternative payment methods. For each method, the simulation model constructs pseudo-HMO groups from the selected data source (CMHS data or HMO data). Six group sizes are evaluated: 500; 1,000; 2,500; 5,000; 10,000; and 20,000. Both randomly-selected groups and geographic-based groups are analyzed. For each group, the model estimates the 1992 payments to the HMO based on the specific payment method. The estimated payments are then compared to the 1992 actual costs, and the evaluation statistics are calculated based on the results at the group level.

4. Statistics for Evaluation. After a review of the literature, seven statistical measures were selected to serve as the basis for evaluation of the accuracy of the alternative payment methods: (1) mean absolute value of error in estimated payments, (2) mean absolute value of error in the predictive ratio, (3) percentage of groups with less than 5 percent error in estimated payments, (4) percentage of groups with more than 10 percent error in estimated payments, (5) product moment correlation, (6) R-square, and (7) mean squared error as percent of mean prospective payment. All statistics were computed at the group level.

5. Alternative Payment Methods. Results are presented in this report for a number of different payment methods based on partial capitation, reinsurance, experience rating, and select and ultimate rates. A number of blended rate methods are also examined.<sup>4</sup>

#### Summary of Results

The evaluation results for the alternative payment methods investigated in this study are presented in detail in Chapters 2 to 6 of the final report. Here, we summarize key findings and results.

1. AAPCC Payment Method. Even though the AAPCC explains less than one percent of the variance in Medicare costs at the individual level, it performs better at the group level. For 1995 the AAPCC capitation payment varied from approximately \$100 per month (for a female age 65-69, non-Medicaid and non-institutionalized in a low AAPCC county) to approximately \$1400 per month (for a male, age 85+, Medicaid, Kings County, NY). Thus, at the individual level, the AAPCC is not a good predictor of actual costs, especially for the 20 percent of Medicare eligibles with zero expenses in a year and the 1 percent of eligibles with expenses exceeding \$50,000 per year. However, at the group level, the AAPCC performs better and was not one of the worst payment methods tested. Unfortunately, the AAPCC does not compare favorably with some of the better payment methods that were investigated. In general, it appeared that the AAPCC produced reasonable estimates of local fee-for-service costs for

most simulated groups.

2. Partial Capitation Models. A variety of different partial capitation models were investigated. Models using risk corridors were also analyzed. It appeared that several of the partial capitation and risk corridor models were quite successful in limiting the amount of financial risk that must be borne by health plans, especially for plans with smaller Medicare enrollments (e.g., less than 5,000 enrollees). The results for partial capitation models with capped risk corridors were especially promising.

3. Reinsurance Models. Both reinsurance and outlier payment models were investigated. Continuance tables were used to estimate the impact of catastrophic medical expenses in a number of different scenarios. It appeared that reinsurance and outlier payments are effective in providing protection to health plans against the risk of high-cost cases and catastrophic expenses, which is a very significant factor for a health plan providing health services to Medicare eligibles. Reinsurance tables were also calculated for the HMO Outlier Payment Demonstration and the Medicare Choices Demonstration.

4. Select and Ultimate Rates. The analysis conducted for this study demonstrated that there can be severe selection effects (favorable and adverse) for groups of Medicare enrollees, especially in the first 2-3 years of enrollment in an HMO. The analysis of select and ultimate rates indicated that rate adjustments for initial enrollments can help to mitigate the adverse consequences of severe selection effects.

5. Experience Rating. Experience rating is the principle method used by private insurers to set premium rates for employer-sponsored groups. However, payment models using experience rating had great difficulty in accurately predicting future costs for smaller groups of Medicare eligibles. For most of the experience rating models that were tested, the level of accuracy was comparable to the level of accuracy of the AAPCC payment method (for groups of Medicare eligibles with less than 5,000 persons). Analysis indicated that the relatively low level of accuracy resulted from the difficulty in predicting deaths, changes in open groups, and the frequency and severity of high-cost

cases in the Medicare population. In addition, due to information lags in claims data processing, experience rating requires a two-year period for projection of historical costs (1990) to the projected year (1992).

Although the initial set of experience rating models did not perform well in predicting actual 1992 costs for smaller groups, other models with various refinements were investigated. A modification of the basic experience rating model that included both pooling of base year claims and reinsurance coverage in the projected year greatly increased the accuracy in predicting actual costs.

6. Blended Rate Methods. Blended rate models that utilize two or more of the rate-setting techniques discussed above were also evaluated. It appears that the most promising models incorporate features related to both prospective and retrospective reimbursement techniques and also features related to risk sharing between HCFA and the participating health plans (especially for plans with smaller enrollments).

#### Implications of Study

The results of this study indicate that there are a range of rate-setting methods and payment models that can be used to improve HCFA payment to risk HMOs. At a group level, the current AAPCC methodology is a modestly effective payment method. It is not particularly accurate in predicting actual costs. However, it does produce baseline average payment rates that appear to be reasonable estimates of local fee-for-service costs in most cases. The benefits of improved payment methods would be: (1) improved fairness in payments to HMOs, leading to more HMOs being willing to offer coverage to Medicare enrollees, and (2) improved accuracy in payments to HMOs, leading to more savings for HCFA.

These dual impacts (more HMOs participating with more savings to HCFA) become all the more important since the Medicare program is facing perhaps the most sweeping changes since its inception in 1965. The proposed legislative changes have resulted partly in response to the projected insolvency of the

Medicare trust fund by the year 2002 and other budgetary concerns.

A variety of managed care initiatives have been proposed by pending legislation and by recent HCFA demonstration projects. The managed care initiatives have focused on generating cost savings by using managed care plans to increase the degree of utilization management for Medicare enrollees and to take advantage of other cost containment mechanisms utilized by managed care plans (i.e., capitation of providers, delivering care in the lowest cost setting, primary care gatekeepers, provider network management, economic incentives and risk-sharing arrangements, etc.). Features of proposals have included: permitting a wide variety of managed care organizations to contract with HCFA for Medicare enrollees, provision of reinsurance coverage with HCFA acting as reinsurer, allowing alternative payment methods and risk-sharing arrangements for managed care organizations, and use of competitive bidding and competitive pricing approaches.

In its present form, the proposed legislation will open up the Medicare program to a much wider range of managed care organizations, compared to the current Medicare risk contracting program with HMOs. If the legislation that is passed is similar to its current form, it will be necessary for HCFA to develop new payment methods that are appropriate for the broader range of managed care organizations. In particular, provider-sponsored organizations (PSOs) may require payment methods that reduce the level of risk borne by the health plan.

In the final report of this study, alternative payment methods that are applicable to both risk HMOs and other forms of managed care organizations are identified and evaluated. The accuracy, reliability, and appropriateness of the alternative methods are compared, with discussion of the strengths and weaknesses of each method. In addition, key issues related to rate-setting for the new types of managed care organizations that may be permitted to participate in Medicare on a full-risk or partial-risk basis through proposed legislative changes are also discussed.

## Notes

1. Rossiter, L.F., H.C. Chiu, and S.H. Chen, "Strengths and Weaknesses of the AAPCC: When Does Risk Adjustment Become Cost Reimbursement?" in H.S. Luft (editor), HMOs and the Elderly, Ann Arbor, MI: Health Administration Press, 1994.
2. See for example, Brown, Randall S., et al., "Do Health Maintenance Organizations Work for Medicare?" Health Care Financing Review, 15(1):7, Fall 1993; Hill, Jerrold W., and Randall S. Brown, Biased Selection in the TEFRA HMO/CMP Program - Final Report, prepared by Mathematica Policy Research, Inc., for the Health Care Financing Administration, contract number 500-88-0006, September 21, 1990; Hill, Jerrold W., et al., The Impact of the Medicare Risk Program on the Use of Services and Cost to Medicare, Princeton, NJ: Mathematica Policy Research, December 1992.
3. There is a large range in AAPCC rates across counties due to the geographic adjustment factor. For calendar year 1995, the AAPCC rates ranged from under \$200 per month for some rural counties to a high of \$646.88 per month for Kings County, New York. The geographic differences in payment rates have led to high HMO enrollments in some areas with relatively high AAPCCs (i.e., South Florida, Los Angeles, etc.) and no enrollment in HMOs in other areas with low AAPCC payment rates.
4. In the Analysis Plan for the study, it was indicated that we would test and evaluate four alternative payment methods using the simulation methods described earlier. As the study progressed, additional payment methods were identified as we searched for methods that would work in the Medicare context. Various refinements of methods that appeared to be promising were also tested. A total of 44 alternative payment methods were eventually tested and evaluated using the simulation model. Results are presented in this report for 26 of the methods. Full results for all 44 payment methods are available from the authors.

### Acknowledgements

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Chapter:

Introduction and Background

Since passage of the Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982, the Medicare risk contracting program with health maintenance organizations (HMOs) and competitive medical plans (CMPs) has become a major source of health services for the Medicare-eligible population. As of January 1995, there were 2.3 million Medicare eligibles who were enrolled in HMOs and CMPs under risk contracts. The enrollment in HMOs and CMPs increased 27 percent during calendar year 1994. The number of plans contracting with HCFA on a risk basis increased 41 percent in calendar year 1994 from 109 to 154 plans. As of February 1996, there were 3.2 million Medicare enrollees in 194 risk plans.

In general, the HMOs and CMPs that are participating in Medicare on a risk basis have been shown to provide quality health care services in a cost-effective manner. Most Medicare enrollees in HMOs and CMPs also appear to be well-satisfied with the care they have received.<sup>1</sup>

However, although there have been significant increases in risk enrollment and the number of plans contracting with HCFA in the past year, enrollment is still only nine percent of the total number of Medicare beneficiaries.<sup>2</sup> Less than 40 percent of all established HMOs participate in the risk program. In addition, a substantial amount of the enrollment in HMOs and CMPs is concentrated in a few states. The states with the highest percentage of Medicare beneficiaries in managed care include California (28 percent), Arizona (28 percent), Oregon (22 percent), Nevada (21 percent), and Florida (15 percent). Together, California and Florida account for over 50

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<sup>1</sup> Dolores Gurnick Clement, Sheldon M. Retchin, and Randall S. Brown, "Satisfaction with Access and Quality of Care in Medicare Risk Contract HMOs," in Harold S. Luft (editor) HMOs and the Elderly, Ann Arbor, MI: Health Administration Press, 1994.

<sup>2</sup> Does not include approximately one million Medicare eligibles enrolled in HMOs with cost contracts and in health care prepayment plans.



percent all Medicare enrollees in risk HMOs and CMPs.

The payment method for risk contractors has been identified as one of the problems in limiting HMO participation and risk enrollment.<sup>3</sup> Medicare pays participating HMOs and CMPs according to the Adjusted Average Per Capita Cost (AAPCC) payment methodology, which has been used since the beginning of the Medicare risk program. The AAPCC payment method is based on 95 percent of the estimated cost that Medicare HMO enrollees would have experienced if they had stayed in the fee-for-service sector.

The purpose of this study was to evaluate four alternative payment methods for risk HMOs: (1) reinsurance, (2) select and ultimate rates, (3) partial capitation and blended rates, and (4) experience rating. Reinsurance methods provide protection to participating health plans against the cost of high-cost cases and catastrophic expenses. Methods using select and ultimate rates take into account the regression to the mean phenomenon and other trends in health care costs over time. Partial capitation methods place health plans at risk for less than 100 percent of the full capitation amount by covering selected services (physician services, Part B services, etc.) or other defined coverage arrangements. Experience rating approaches are based on the prior cost experience of the health plan and can involve prospective, retrospective or mixed methods.

The next sections present the background for the study, based on a review of relevant literature and prior research. The following topics are discussed: (1) the Medicare HMO risk contracting program through March 1985, (2) the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA), (3) prior evaluations of the Medicare risk program, (4) the AAPCC payment methodology and its limitations, and (5) current research to revise the AAPCC and develop risk adjustment methods for Medicare beneficiaries. The remainder of Chapter 1 discusses proposed legislative changes to the Medicare program, new Medicare demonstrations sponsored by HCFA, and the objectives of this study.

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<sup>3</sup> Randall S. Brown, Dolores Gurnick Clement, Jerrold W. Hill, et al., "Do Health Maintenance Organizations Work for Medicare?" Health Care Financing Review 15(1):7, Fall 1993.

1.1 The Medicare HMO Risk Contracting Program Through March 1985

Prior to 1972, the only type of prepaid health plans authorized to participate in the Medicare program were group practice prepayment plans (now referred to as health care prepayment plans). These plans received prospective payments based on the plan's projected costs for Part B services only, which were then adjusted at the end of the contract year to equal 80 percent of the plan's reasonable costs (with copayments by beneficiaries making up the other 20 percent of reasonable costs).<sup>4</sup> Cost and risk-based contracts for the provision of both Part A and Part B benefits by HMOs participating in the Medicare program were first authorized in the Social Security Amendments of 1972. However, final regulations for these two contract options were not issued until late in 1976, thereby preventing HMOs from entering into these contracts until 1977. Participation in Medicare under one of these two options was limited to only those HMOs which met all applicable Federal qualification requirements and had at least 5,000 enrollees.

Reimbursement under either option was provided through interim monthly capitation payments, based on a prospective estimate by Medicare of the plan's cost for providing services to its Medicare enrollees. For HMOs selecting the cost-reimbursement option, actual plan costs for the contract period were calculated using reports submitted by the plan, and then adjusted to reflect reasonable and allowable costs. Adjusted plan costs were then compared to total interim capitation payments to determine whether any retrospective adjustments in payment were necessary. For HMOs with risk-based contracts, actual costs for the contract period were calculated and compared to a retroactively determined adjusted average per capita cost (AAPCC), which was an estimate of what Medicare would have paid for the HMO's enrollees if they had instead received services in the fee-for-service (FFS) sector. No retrospective adjustments in payment were permitted. HMOs could share in any

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<sup>4</sup> Kathryn M. Langwell and James P. Hadley, "Capitation and the Medicare Program: History, Issues, and Evidence," Health Care Financing Review, 1986 Annual Supplement, pp. 9-20.

savings (up to 10 percent of the AAPCC) which occurred under this arrangement, but were required to absorb 100 percent of any losses that occurred.

As of December 31, 1979, only 33 HMOs (out of 215 nationwide) were participating in the Medicare program under one of these two contract options (32 cost contracts and only one risk contract).<sup>5</sup> The total number of Medicare beneficiaries enrolled in these 33 plans was 62,034, which represented less than one percent of all Medicare beneficiaries in 1979. As a result of this disappointing participation by HMOs in the Medicare program, the Health Care Financing Administration (HCFA) developed a number of demonstration projects to test alternative forms of HMO risk contracting. The first of these demonstrations (the Medicare Capitation Demonstration) included 8 HMOs which began participation in the demonstration during 1980 or 1981.<sup>6</sup> A variety of risk-sharing arrangements and reimbursement models were tested, with reimbursements to plans varying from 85 to 95 percent of the AAPCC. These 8 demonstration plans had 29,409 Medicare beneficiaries enrolled by December 31, 1981. Results from this demonstration project provided valuable information for the revisions made to Medicare risk contracts in the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA, discussed in more detail below). Although TEFRA was passed in 1982, it did not go into effect until April 1, 1985.

Before TEFRA went into effect, a second demonstration project, entitled the Medicare Competition Demonstrations, began with 26 HMOs, most of which began participation during 1983 and 1984.<sup>7</sup> By December 31, 1984 these 26 plans had 117,000 Medicare beneficiaries enrolled under risk contracts. Each HMO received a prospective monthly per capita payment from HCFA equal to 95 percent of the AAPCC. The HMOs could keep any savings generated by providing

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<sup>5</sup> Kathryn M. Langwell and James P. Hadley, "Evaluation of the Medicare Competition Demonstrations," Health Care Financing Review, 11(2):65, Winter 1989.

<sup>6</sup> Langwell and Hadley, "Capitation and the Medicare Program: History, Issues, and Evidence."

<sup>7</sup> *ibid.*

services for less than 95 percent of the AAPCC. The HMOs in this demonstration operated for periods ranging from 9 months to 2 1/2 years, with all but one of them converting to a TEFRA risk contract between April 1, 1985 and June 30, 1985. By the end of 1986, however, four of the demonstration HMOs had terminated their Medicare risk contracts. The results from this demonstration also provided important information for the final regulations developed to implement TEFRA in 1985.<sup>8</sup>

### 1.2 The Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA)

TEFRA authorized prospective per capita payments to HMOs with Medicare risk contracts at a rate equal to 95 percent of the AAPCC, where the AAPCC is defined to be the estimated average per capita amount that would be paid by HCFA if services for Medicare HMO enrollees were provided by the local FFS sector. HMOs with risk contracts must meet all of the requirements of the Social Security Act for Medicare participation and all of the requirements of the Public Health Services Act for federal certification as an HMO. Organizations that meet the requirements of the Social Security Act for Medicare participation but do not meet the requirements of the Public Health Services Act for federal certification as an HMO are known as competitive medical plans (CMPs). (Like HMOs, CMPs can also participate in the Medicare program using risk-based contracts and are reimbursed by HCFA in the same manner as HMOs.)

HMOs with risk contracts are required to compute an adjusted community rate (ACR), which is an estimate of the premium the HMO would have charged Medicare enrollees for the Medicare benefit package based on the premium-setting policies the HMO uses for its non-Medicare enrollees. The ACR calculation may use data on the HMO's experience with enrollees under age 65, with adjustments for higher volume and intensity of services used by Medicare

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<sup>8</sup> For a description of the results of the demonstration project, see Kathryn M. Langwell and James P. Hadley, National Evaluation of the Medicare Competition Demonstrations - Summary Report, prepared by Mathematica Policy Research, Inc. for the Health Care Financing Administration, contract number 500-83-0047, January 31, 1989.

beneficiaries, or it may be based directly on the plan experience with Medicare enrollees. If the AAPCC payment the HMO receives is greater than its ACR, the HMO must use the difference to provide additional benefits, or to reduce cost-sharing, for Medicare beneficiaries; otherwise, the HMO must accept less than 95 percent of the AAPCC.

In June of 1985, 3 months after the implementation of TEFRA, there were 25 HMOs with risk contracts covering 262,098 Medicare beneficiaries.<sup>9</sup> Over the next 6 years, the number of HMOs with risk contracts increased to 74, with 1.1 million Medicare beneficiaries enrolled (as of July 1, 1991).<sup>10</sup> In addition, there were 14 CMPs with risk contracts covering 176,947 Medicare beneficiaries as of July 1, 1991. Although these figures indicate the substantial growth which occurred in Medicare risk contract enrollment from 1985 to 1991, a significant number of HMOs decided to leave the risk contract program during the years 1987 through 1989, thereby slowing the growth in Medicare risk-based enrollment. The following table provides data on risk contract non-renewals, terminations, and conversions from 1986 through 1990.<sup>11</sup>

	<u>Calendar Year</u>				
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
# of Non-Renewals <sup>12</sup>	9	51	34	33	5
# of Conversions to Non-Risk Contracts	<u>1</u>	<u>1</u>	<u>3</u>	<u>7</u>	<u>9</u>
Total # Leaving the Risk Program	10	52	37	40	14

<sup>9</sup> 1988 January Update of Medicare Enrollment in HMOs, InterStudy, Excelsior, Minnesota, April 1988.

<sup>10</sup> Medicare Prepaid Health Plans, monthly report prepared by the Health Care Financing Administration, July 1991.

<sup>11</sup> ibid.

<sup>12</sup> This line includes the following categories: plan non-renewals, HCFA non-renewals, mutual non-renewals, plan terminations, HCFA terminations, and mutual terminations.

While the number of HMOs leaving the risk contract program between 1987 and 1989 was large, it is important to note that many of these plans had never enrolled any Medicare beneficiaries under their risk contracts (e.g., 27 of the 40 plans leaving the program in 1989 had no risk contract enrollees).<sup>13</sup> Mathematica Policy Research found that key variables related to the nonrenewal of Medicare risk contracts were: IPA model type, smaller Medicare risk enrollment, higher disenrollment, less favorable selection, having 10 percent or more of enrollees in rural counties, charging a relatively high premium, having sizeable AAPCC differences between counties within the plan's service area, and experiencing a financial loss on combined commercial and Medicare business.<sup>14</sup>

Despite the high turnover of plans during the early years of the TEFRA risk program, the enrollment in HMOs has continued to grow. Currently, there are 3.2 million Medicare beneficiaries enrolled in 194 risk HMOs.

### 1.3 Prior Evaluations of the Medicare Risk Program

Mathematica Policy Research, Inc. (MPR) in Princeton, New Jersey evaluated the Medicare risk contracting program from 1983 to 1993 under two contracts with the Health Care Financing Administration (HCFA). The first study focused on the demonstration program for risk-based HMOs that was sponsored by HCFA in the early 1980s. The second study evaluated the experience of 98 Medicare risk contractors in the late 1980s. The results of the MPR studies on the program's effectiveness with respect to quality of care, patient satisfaction, financial impacts, health service utilization, access to care, and other issues have been documented in a series of 27 reports, published from 1985 to 1993, and numerous articles in books and

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<sup>13</sup> Richard Lichtenstein, et al., "Selection Bias in TEFRA At-Risk HMOs," Medical Care 29(4):318, April 1991.

<sup>14</sup> Jeanne McGee and Randall S. Brown, "What Makes HMOs Drop Their Medicare Risk Contracts?" Princeton, NJ: Mathematica Policy Research, May 1992.

journals.<sup>45</sup>

Quality of Care, Access to Care, and Patient Satisfaction

The decision to enroll with an HMO is an important decision for a person who is eligible for Medicare. Quality of care, access to care, patient satisfaction, and out-of-pocket costs are key factors related to the decision. MPR conducted extensive analyses of these topics for persons enrolled in risk HMOs compared to persons in the traditional fee-for-service Medicare program.

MPR assessed the impacts of risk contractors on the quality of care received by Medicare eligibles by: (1) comparing the services received by HMO and fee-for-service patients who were hospitalized for stroke or colon cancer, and their outcomes, (2) comparing the ambulatory care received by HMO and fee-for-service patients for three chronic conditions (joint pain, urinary incontinence, and recurring chest pain), and (3) comparing the satisfaction of HMO enrollees and non-enrollees with various aspects of the care they received.<sup>16</sup> For inpatient care, the rates of death, readmission to the hospital, and postadmission complications were similar among HMO and fee-for-service patients, indicating no differences in outcomes. In addition, HMOs utilized less resource-intensive care and discharged stroke and colon cancer patients to lower-cost settings more frequently. The length of hospital stays were reduced by 18 percent for cerebrovascular cases and 23 percent for colon cancer for HMO patients compared to patients in fee-for-service settings. Substantial reductions in utilization of discretionary tests and procedures were found among HMO patients, as compared to fee-for-service patients. For

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<sup>15</sup> Randall S. Brown, Jeanette W. Bergeron, Dolores G. Clement, et al., "The Medicare Risk Program for HMOs - Final Summary Report on Findings from the Evaluation," HCFA Contract Number 500-88-0006, Princeton, NJ: Mathematica Policy Research, February 1993.

<sup>16</sup> Sheldon Retchin, Randall Brown, Rhoda Cohen, Dolores Clement, MeriBeth Stegall, and Barbara Abujaaber, "The Quality of Care in TEFRA HMOs/CMPs," Richmond, VA: Medical College of Virginia, December 1992; Dolores Gurnick Clement, Sheldon M. Retchin, MeriBeth H. Stegall, and Randall S. Brown, "Evaluation of Access and Satisfaction with Care in the TEFRA Program," Richmond, VA: Medical College of Virginia, October 1992.

outpatient care. HMOs provided comparable access to ambulatory care and produced similar outcomes with less intensive use of resources.

To assess patient satisfaction and other issues, MPR conducted a telephone survey of 6,476 randomly-chosen HMO enrollees and a matched sample of 6,381 fee-for-service Medicare beneficiaries. Over 90 percent of HMO enrollees ranked their care as good or excellent along every dimension (availability of different types of care, ease of obtaining appointments, waiting times, quality of facilities, thoroughness of exams and treatment, results of care received, etc.). In general, the HMO satisfaction level was equivalent to the high level of satisfaction expressed by fee-for-service beneficiaries. HMO enrollees were more satisfied than their fee-for-service counterparts with respect to out-of-pocket costs. However, of the beneficiaries who voluntarily joined a risk plan, 20 percent dropped out within 12 months after joining, although the rates varied widely across risk plans.

#### Medicare Risk Program Effects on Service Use and Costs

MPR investigated the effects of the risk program on the use and cost of services.<sup>17</sup> They found that HMOs used 17 percent fewer hospital days and required 10.5 percent lower costs for hospital, physician, SNF and home health care, compared to fee-for-service patients. MPR concluded that HMOs provided cost-effective care to Medicare enrollees in terms of service utilization. However, although the Medicare risk program has enjoyed steady growth in the number of HMO enrollees since its inception in 1985 and the enrollees appear to be very satisfied with their quality of care and out-of-pocket costs, the MPR reports identified three problems with the risk program as it is currently structured: (1) the payment method used to reimburse HMOs, (2) favorable selection experienced by the participating risk contractors, and (3) whether the Medicare program is realizing savings from the risk program.

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<sup>17</sup> Randall S. Brown and Jerrold W. Hill, "The Effects of Medicare Risk HMOs on Medicare Costs and Service Utilization," in Harold S. Luft (editor) HMOs and the Elderly, Ann Arbor, MI: Health Administration Press, 1994.



HMOs are paid according to the Adjusted Average Per Capita Cost (AAPCC) payment method. Under this method, HCFA payments to HMOs for Medicare enrollees are set at 95 percent of the fee-for-service cost experienced by Medicare for persons of the same age, sex, welfare status, institutional status, and county of residence. The AAPCC payment method has received substantial criticism in part because it does a relatively poor job in predicting health needs or health costs for HMO enrollees.

The MPR studies found that HMOs receive favorable selection in enrollment of Medicare eligibles (e.g., the persons who enroll in HMOs had lower Medicare reimbursements than average in the year before they enrolled in the HMO). This factor is not accounted for in the current payment method.<sup>18</sup>

Thus, even though HMOs are paid 95 percent of the AAPCC which should result in five percent savings, the Medicare program might lose money if HMO enrollees would have cost less than 95 percent of the AAPCC (with fee-for-service care). MPR developed an econometric model and estimated that the Medicare program lost 5.7 percent on the average risk enrollee.<sup>19</sup>

#### HMO Profits on Their Medicare Risk Plans

MPR examined the profitability of the Medicare risk contractors based on data for 1987, 1988 and 1989. They found that Medicare risk plans lost \$4.48 per member per month on average. Only 48 percent of HMOs examined were estimated to have made profits on their Medicare risk business. Plan characteristics that were related to higher profits included: for-profit status, high AAPCC payment rates, coverage of prescription drugs, pre-TEFRA demonstration experience with Medicare beneficiaries, and a high proportion of enrollment comprised by Medicare members. Unprofitable Medicare risk plans had low AAPCC payment rates, high hospital use rates, and were predominately

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<sup>18</sup> Jerrold W. Hill and Randall S. Brown, "Biased Selection in the TEFRA HMO/CMP Program," Princeton, NJ: Mathematica Policy Research, September 1990.

<sup>19</sup> Jerrold Hill, Randall Brown, Dexter Chu, and Jeanette Bergeron, "The Impact of the Medicare Risk Program on the Use of Services and Cost to Medicare," Princeton, NJ: Mathematica Policy Research, December 1992.

not-for-profit plans. Plans that lost money also failed to expose physicians to significant financial risk.<sup>20</sup>

#### Factors Affecting the Lack of Medicare Risk Plans in Rural Areas

MPR analyzed factors related to the relative scarcity of Medicare risk plans in rural areas. Rural counties covered by Medicare risk plans had higher payment rates, larger populations, and more physicians than rural counties that HMOs exclude from the service area of their Medicare plans but not from the service area covered by their commercial plans. HMOs cite low payment, small population, the market power of physicians, adverse selection, and a commitment to rural areas as factors affecting the ability and willingness of plans to serve Medicare beneficiaries in rural areas. Only one strictly rural Medicare risk plan was in operation in 1990.<sup>21</sup>

#### The Effects of HMO Market Penetration on Medicare Fee-for-Service Costs

MPR also analyzed the "spillover effects" of managed care on Medicare costs in the fee-for-service sector.<sup>22</sup> A variety of statistical models were used to estimate the impact of the Medicare risk program on the average Medicare reimbursements in the fee-for-service sector. The results were mixed with some models showing no effect of risk plan penetration on fee-for-service costs, and other models showing significant declines in fee-for-service costs with modest increases in penetration. The topic of managed care spillover effects on Medicare fee-for-service costs has been examined by other

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<sup>20</sup> Richard T. Shin and Randall S. Brown, "HMOs' Profits on Their Medicare Risk Plans," Princeton, NJ: Mathematica Policy Research, February 1993; Jeanette Bergeron and Randall S. Brown, "Why Do the Medicare Risk Plans of HMOs Lose Money?" Princeton, NJ: Mathematica Policy Research, May 1992.

<sup>21</sup> Serrato, Carl and Randall Brown, "Why Do So Few HMOs Offer Medicare Risk Plans in Rural Areas," Princeton, NJ: Mathematical Policy Research, June 1992.

<sup>22</sup> Dolores Gurnick Clement, Phillip M. Gleason, and Randall S. Brown, "The Effects of HMO Market Penetration on Medicare Fee-for-Service Costs," Richmond, VA: Medical College of Virginia, December 1992.

researchers.<sup>23</sup> Most studies have shown a positive relationship between HMO penetration and lower fee-for-service costs.

#### 1.4 The AAPCC Payment Methodology and its Limitations

The AAPCC, as defined by TEFRA, represents "an estimate of the average per capita cost that would have been incurred by Medicare on behalf of each class of Medicare enrollee of the organization if that class of enrollee had received its covered services from providers and suppliers other than the eligible organization in the same or similar geographic area served by the organization."<sup>24</sup> Classes of Medicare enrollees are required to be defined based on age, disability status, and other factors determined to be appropriate to ensure actuarial equivalence. Currently, 60 classes of beneficiaries are defined by age (65-69, 70-74, 75-79, 80-84, and 85 or older), sex (male, female), disability/entitlement status (aged or disabled), welfare status (Medicaid or non-Medicaid), and institutional status (institutionalized or non-institutionalized). In effect, the AAPCC represents a rate book of values, one for each class of beneficiary. This rate book is then used to determine HMO payment rates which vary by county across the U.S.

Calculation of a set of AAPCC rates involves four general steps:<sup>25</sup>

1. Projection of the United States per capita cost (USPCC) for Medicare services for an HMO's contract year. The USPCC is calculated by Medicare enrollment status, separately for Part A and Part B services, and includes a

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<sup>23</sup> W. Pete Welch, "HMO Market Share and its Effect on Local Medicare Costs," in Harold S. Luft (editor), HMOs and the Elderly, Ann Arbor, MI: Health Administration Press, 1994; Tom MaCurdy, "Evaluating the Evidence on the Cost-Effectiveness of HMOs in Medicare," presented at the American Enterprise Institute Conference: Medicare Reform -- What Can the Private Sector Teach Us? July 24, 1995; Laurence C. Baker, "Can Managed Care Control Health Care Costs: Evidence from the Medicare Experience," mimeo, November 1993; Jack Rodgers and Karen E. Smith, "Do Medicare HMOs Reduce Fee-for-Service Costs?" Washington, DC: Price Waterhouse, September 1995.

<sup>24</sup> Federal Register, January 10, 1985, p. 1381.

<sup>25</sup> John P. Cookson, et al., Actuarial Review of the AAPCC Methodology, prepared by Milliman and Robertson, Inc. for the Health Care Financing Administration, contract number 500-86-0036, July 28, 1987.

loading factor for administrative costs.

2. Determination of county geographic adjustment factors, which reflect the historical relationships between Medicare cost per capita in each county of an HMO's service area and the entire United States, adjusted to reflect Medicare reimbursement characteristics in the year for which the AAPCC is calculated.
3. Estimation of county non-HMO average per capita cost for an HMO's contract year, by Medicare enrollment status, separately for Part A and Part B services.
4. Calculation of county AAPCC values for an HMO's contract year, reflecting Medicare enrollment status and demographic variables, separately for Part A and Part B services.

The last step of this process is intended to adjust for the differences between beneficiaries who choose to enroll in an HMO and the general Medicare beneficiary population from which the HMO enrollees are drawn.

During the past 10 years, as the number of HMOs with Medicare risk contracts and the number of Medicare beneficiaries enrolled in HMOs have increased, the AAPCC payment methodology has been the subject of increasing criticism and scrutiny. The methodology has been criticized on a number of technical and conceptual grounds, which are discussed briefly below.

Problems related to the calculation of the national average per capita cost (USPCC) for Medicare

The USPCC is based on the claims experience of all Medicare beneficiaries during a historical period of time at least 12 months prior to the year for which AAPCC rates are being estimated. As a result, the USPCC must be projected from the historical period to the rating period on the basis of a number of assumptions, including: (1) the extent to which claims received from the historical period represent the total claims incurred for that period, (2) the rate of inflation in health services costs between the period when claims were incurred and the projection period, and (3) the amount of costs or savings resulting from proposed regulatory or administrative policy changes in the Medicare program, which may or may not actually be

implemented.

Each of these assumptions can introduce error into the calculation of the USPCC, and since the USPCC is the basis for the calculation of AAPCC rates, any errors will have a direct and significant effect on the AAPCC.<sup>26</sup> The likelihood of errors in the calculation of the USPCC will be greater as the gap between the historical period and the project period increases, the rate of inflation in health services costs becomes more variable, and as significant changes are implemented in the Medicare program. Other problems with the calculation of the USPCC include the assumption that inflation in health services costs is uniform across all counties and that differences in health expenditures by class of Medicare beneficiary are also uniform across all counties.<sup>27</sup>

Problems in converting the national average cost to the average cost for local HMO service areas (geographic adjustment)

There are two primary factors which cause local Medicare costs to vary from the national average per capita cost for Medicare. First, there are differences in the unit prices of individual medical services, primarily due to differences in hospital, physician, and other provider charges. Second, there are differences in the use of individual medical services, which are determined by variation in physician practice patterns, differences in the health status of beneficiaries and the resulting need for services, and variation in the degree to which a beneficiary group's need for services has been satisfied in the past. The AAPCC geographic adjustment attempts to account for as much of the systematic variation caused by differences in unit prices and use of services as possible.

While there is a consensus regarding the appropriateness of adjusting

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<sup>26</sup> Cookson, et al., Actuarial Review of the AAPCC Methodology.

<sup>27</sup> Gordon R. Trapnell, David R. McKusick, and James S. Genuardi, An Evaluation of the Adjusted Average Per Capita Cost (AAPCC) Used in Reimbursing Risk-Basis HMOs Under Medicare, Annandale, VA: Actuarial Research Corporation, contract number HCFA-80-ORDS-87, April 1982.

for differences in unit prices and for differences in the need for health care across geographic areas, the appropriateness of adjusting for variation in physician practice patterns and differences in the degree to which need for services has been satisfied in the past has been questioned. These concerns arise for two reasons. First, adjustments for variation in practice patterns can perpetuate any inefficiencies which exist in FFS practice patterns across locations, thereby resulting in higher than necessary AAPCC rates. This would lead to HCFA overpaying HMOs with risk contracts.

Second, adjustments for differences in the degree to which past need for services has been satisfied can result in artificially low AAPCC rates for areas where there has been a consistent pattern of unmet need (e.g., rural areas). If HMOs were successful in satisfying this unmet need, low AAPCC rates would not cover their costs for providing care, thereby discouraging these areas from being covered by plans participating in the risk program.

In addition to the goal of accurately estimating local Medicare costs, three other goals for the geographic adjustment factor have been identified: (1) actuarial homogeneity, i.e., developing an AAPCC rate for an entire geographic area that reasonably reflects the mean costs of any subarea, (2) temporal stability, i.e., minimal fluctuations in AAPCC rates from one year to the next, and (3) policy aspects, such as, objectivity of the geographic area definition.<sup>28</sup> With respect to these goals, some research indicates that the current geographic adjustment factor has produced rates which can vary significantly for neighboring counties within an HMO's service area and rates which fluctuate significantly from one year to the next.<sup>29</sup> From the perspective of HMOs with risk contracts, significant fluctuations in annual

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<sup>28</sup> Frank W. Porell, et al., "Alternative Geographic Configurations for Medicare Payments to Health Maintenance Organizations," Health Care Financing Review 11(3):17, Spring 1990.

<sup>29</sup> See, for example, Louis F. Rossiter and Killard W. Adamache, "Payment to Health Maintenance Organizations and the Geographic Factor," Health Care Financing Review 12(1):19, Fall 1990, and W.P. Welch, "Improving Medicare Payments to HMOs: Urban Core Versus Suburban Ring," Inquiry 26(1):62, Spring 1989.

AAPCC rates make it difficult for the HMO to establish long-term revenue and budget projections, thereby disrupting the plan's financial operations. Rates which vary significantly across counties within an HMO's service area are also troublesome since the plan's costs for providing care will be determined by the whole market area in which it operates, rather than by the individual counties from which it draws its enrollees. Therefore, enrolling a disproportionate number of beneficiaries from a county with a low AAPCC rate will probably lead to losses for the HMO, while enrolling a disproportionate number of beneficiaries from a county with a high AAPCC rate will probably result in increased costs to the Medicare program.

Problems in adjusting the local average cost for differences in the health status of local Medicare beneficiaries and of Medicare HMO enrollees (underwriting factors)

The AAPCC methodology has been shown to be a relatively poor predictor of both health care utilization and expenditures,<sup>30</sup> primarily because it does not adjust for differences in health status among beneficiaries.<sup>31</sup>

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<sup>30</sup> A number of studies have evaluated the ability of the AAPCC to predict health care utilization and expenditures (see Appendix A for a comprehensive list of references concerning the AAPCC and HMOs in the Medicare program). Some of the articles which evaluated the AAPCC include Arlene Ash et al., "An Analysis of Alternative AAPCC Models Using Data from the Medicare History File," unpublished paper, University Health Policy Consortium, Brandeis University, 1986; James Beebe, et al., "Using Prior Utilization to Determine Payments for Medicare Enrollees in Health Maintenance Organizations," Health Care Financing Review 6(3):27, Spring 1985; Paul Eggers and Ron Prihoda, "Pre-enrollment Reimbursement Patterns of Medicare Beneficiaries Enrolled in At-risk HMOs," Health Care Financing Review 4(1):55, September 1982; Leonard Gruenberg, "The AAPCC - A Preliminary Examination of the Issues," unpublished paper, University Health Policy Consortium, Brandeis University, 1982; Mark C. Hornbrook, "Examination of the AAPCC Methodology in an HMO Prospective Payment Demonstration Project," Group Health Journal 5(1):13, Spring 1984; James Lubitz, et al., "Improving the Medicare HMO Payment Formula to Deal with Biased Selection," in Scheffler and Rossiter, eds., Advances in Health Economics and Health Services Research, volume 6, JAI Press, Inc., Greenwich, Conn., 1985; Kenneth G. Manton and Eric Stallard, "Analysis of Underwriting Factors for AAPCC," Health Care Financing Review 14(1):117, Fall 1992; J. William Thomas and Richard Lichtenstein, "Including Health Status in Medicare's Adjusted Average Per Capita Cost Capitation Formula," Medical Care 24(3):259, March 1986.

<sup>31</sup> The AAPCC attempts to indirectly adjust for differences in health status among beneficiaries through the use of age/sex, welfare status, and institutional status underwriting factors. However, these factors are based on national data which obviously do not account for variations in the use of health services across counties, metropolitan areas, or even states. This

As a result, the AAPCC rates do not adequately adjust for biased selection of enrollees in HMOs. Biased selection is a serious problem for both HMOs with Medicare risk contracts and for the federal government. If adverse selection occurs for participating HMOs, the AAPCC will fail to reimburse HMOs for their true costs of providing care to Medicare enrollees. Continued losses would lead to HMOs terminating their risk contracts and would discourage other HMOs from joining the risk contract program. On the other hand, if favorable selection occurs for participating HMOs, payments by Medicare to the HMOs will be greater than the true costs of providing care to the HMO Medicare enrollees. Such overpayments would cause the cost of the Medicare program to be greater than would have occurred if the HMO enrollees had remained in the FFS sector.

Problems related to use of FFS sector costs to estimate costs of enrollees in HMOs

Since TEFRA regulations require HMOs to be reimbursed based on what their enrollees would have cost Medicare if they had remained in the FFS sector, an adjustment must be made to the estimates of county-specific rates to remove HMO Medicare enrollee costs included in the calculation of the USPPC. One problem with this practice is that Medicare may not receive the data that it needs from HMOs to accurately adjust for the costs of beneficiaries enrolled in HMOs. This methodology also aggravates the problem of biased selection, especially as the percentage of Medicare beneficiaries in a particular market enrolled in HMOs increases. In particular, if healthier beneficiaries are more likely to enroll in HMOs, the cost of beneficiaries remaining in the FFS sector will increase, which will then translate into higher AAPCC rates.<sup>32</sup> This process would cause even larger overpayments to

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problem is especially important with respect to the welfare and institutional underwriting factors, due to the significant variation in Medicaid programs and rates of institutionalization across states.

<sup>32</sup> For evidence concerning biased selection in HMOs with Medicare risk contracts see Jerrold W. Hill and Randall S. Brown, Biased Selection in the TEFRA HMO/CMP Program - Final Report, prepared by Mathematica Policy Research, Inc. for the Health Care Financing Administration, contract



HMOs, tho by causing the costs of the Medicare program to be significantly higher than otherwise would have occurred. As HMO market penetration rates increase, the reliance on FFS costs would also lead to greater variability in AAPCC rates because fewer beneficiaries would remain in the FFS sector over time and those that did remain would be less healthier. On the other hand, a recent paper by Welch finds evidence that increasing HMO market share results in lower FFS costs.<sup>33</sup>

In response to the various problems discussed above, numerous proposals for reforming reimbursement of HMOs with Medicare risk contracts have been suggested. These proposals can be placed in two distinct groups - those that seek to refine the current AAPCC methodology to make it more accurate and those that would replace the AAPCC methodology with some alternative payment system. Some of the proposals in each of these two groups are briefly discussed below.

#### 1.5 Current Research to Revise the AAPCC

Significant research addressing the problems identified above has been conducted since 1980. For example, several alternative methods of converting the national average cost to the average cost for local HMO service areas have been examined.<sup>34</sup> Other research has investigated the use of more recent and/or more complete data sources to estimate the underwriting factors currently used in the AAPCC.<sup>35</sup> However, the problem which has been the

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number 500-88-0006, September 21, 1990 and Fred J. Hellinger, "Selection Bias in HMOs and PPOs: A Review of the Evidence," Inquiry 32(2):135, Summer 1995.

<sup>33</sup> W. Pete Welch, "HMO Market Share and Its Effect on Local Medicare Costs," in Harold S. Luft, ed., HMOs and the Elderly, Ann Arbor, MI: Health Administration Press, 1994.

<sup>34</sup> Porell, et al., "Alternative Geographic Configurations for Medicare Payments to Health Maintenance Organizations," Rossiter and Adamache, "Payment to Health Maintenance Organizations and the Geographic Factor," Welch, "Improving Medicare Payments to HMOs: Urban Core Versus Suburban Ring," and W. Pete Welch, "Defining Geographic Areas to Adjust Payments to Physicians, Hospitals, and HMOs," Inquiry 28(2):151, Summer 1991.

<sup>35</sup> Manton and Stallard, "Analysis of Underwriting Factors for AAPCC."

focus of the majority of research conducted over the past 15 years is biased selection. There are two general methods of compensating for biased selection: (1) risk adjustment or (2) risk sharing. Most of the proposals for reforming reimbursement of HMOs with risk contracts have focused on incorporating better risk adjusters into the current AAPCC methodology. A limited number of proposals have focused on methods of risk sharing to improve reimbursement of HMOs with risk contracts. Specific proposals reflecting each of these methods are briefly discussed below.

#### Research Focusing on Better Risk Adjustors

A great deal of research over the past 10 years has focused on revising the current AAPCC methodology to better adjust for differences in enrollee's health status, either directly or indirectly, by adding and/or deleting factors used to calculate the AAPCC. There are five basic categories of risk adjustors: (1) sociodemographic factors (e.g., age, sex, income, race, education, etc.), (2) perceived health status (usually determined by an individual's response to one survey question indicating the individual's perception of their health status compared to other individuals of the same age), (3) functional health status (often measured by an index, e.g., Activities of Daily Living (ADL) or Instrumental Activities of Daily Living (IADL), which indicates an individual's functional impairment), (4) clinical descriptors which indicate the presence of specific medical conditions (e.g., cancer, heart disease, stroke) or having been hospitalized for a specific condition, and (5) measures of prior utilization of health services, including prior year standardized expenditures and prior year utilization of services. Previous research has tested a number of models incorporating many of these measures, with varying degrees of success. Reviews of these models have generally concluded that incorporating some measure of health status (e.g., diagnostic group) is the most promising refinement to the AAPCC methodology.<sup>36</sup> Three recent efforts to incorporate prior utilization into

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<sup>36</sup> See Arnold M. Epstein and Edward J. Cumella, "Capitation Payment: Using Predictors of Medical Utilization to Adjust Rates," Health Care Financing Review 10(1):51, Fall 1988; James Lubitz, "Health Status Adjustments

the AAPCC include the Payment Amount for Capitated Systems (PACS), the Diagnostic Cost Groups (DCG), and the Ambulatory Cost Groups (ACG) approaches. Each of these approaches is briefly described below.

The PACS methodology determines a payment rate for an HMO based on the health status of the Medicare beneficiaries who actually enroll in the HMO and the input costs faced by the HMO.<sup>37</sup> Health status is measured using a combination of demographic characteristics (e.g., age and sex), disability status (ever disabled), and three variables that together define prior utilization by the beneficiary: (1) the major diagnostic category (MDC) associated with each inpatient hospitalization in the base year, (2) the chronicity of each medical disorder that resulted in a hospitalization, and (3) a patient's use of ambulatory care resources in the base year. Once the health status payment rate has been established, it is multiplied by the input cost adjustors (the Medicare wage index and the location of the HMO in an urban or rural area) to determine the final payment rate to the HMO for each Medicare beneficiary enrolled in the plan.

The DCG methodology incorporates measures of prior utilization of inpatient services and physician discretion into the current AAPCC methodology.<sup>38</sup> A measure of physician discretion was incorporated because of concern that incorporating prior utilization measures into the reimbursement system would penalize efficient providers of health care (lower use of services by beneficiaries would result in lower payment rates) and would provide incentives for providers to manipulate the system (providers might be encouraged to increase use of services by beneficiaries in order to

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for Medicare Capitation," Inquiry 24(4):362, Winter 1987; and Joseph P. Newhouse, "Rate Adjusters for Medicare Under Capitation," Health Care Financing Review, 1986 Annual Supplement, pp. 45-55.

<sup>37</sup> Gerard F. Anderson, et al., "Payment Amount for Capitated Systems," report prepared for the Health Care Financing Administration, contract number 17-C-98990/3-01, 1989.

<sup>38</sup> Arlene Ash, et al., "Adjusting Medicare Capitation Payments Using Prior Hospitalization Data," Health Care Financing Review 10(4):17, Summer 1989.

receive higher payment rates).

The prior utilization measure was created by rating all 3-digit ICD-9-CM codes along 3 dimensions to produce a disease-specific discretion score. A score of 0 indicated low physician discretion while a score of 12 indicated high physician discretion. All beneficiaries were then assigned to 1 of 8 DCG categories based on whether they had been hospitalized, the discretion score for any hospitalizations which did occur (beneficiaries with multiple discharges in the base year were classified based on the hospitalization with the highest DCG level), and their expected future Medicare expenditures. The result of this system is that HMOs receive lower payments for healthier enrollees (those who have not been hospitalized or have had relatively short hospital stays) but receive higher payments for less healthy enrollees (those with chronic or very costly conditions).

DCGs were tested in a HCFA pilot project in which HMOs were paid under the DCG payment system (for aged enrollees only) and also received information from HCFA concerning the payments that the HMOs would have received under the AAPCC system.<sup>39</sup> In this pilot project, the HMOs submitted hospitalization data on their enrollees each month so that HCFA could use this data to assign enrollees to their proper DCG rate cell. This differed from the original research conducted on DCGs, which was based on FFS data from the Medicare Continuous History File. The DCG demonstration ran from 1989 to 1991.

The ACG methodology is similar to both the PACS and DCG systems described above. ACGs are primarily applicable to the ambulatory care sector and are based on an individual's demographic characteristics (age and sex) and their pattern of disease over an extended period of time. In particular, ICD-9-CM diagnoses assigned during ambulatory encounters are used to determine whether an individual belongs in one of a number of broad disease clusters. The broad disease clusters are intended to reflect the persistence/recurrence

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<sup>39</sup> For details on the DCG pilot demonstration, see Lyle Nelson and Sharon Arnold, Final Report on the Assessment of the Diagnostic Cost Group Pilot Demonstration, prepared by Mathematica Policy Research, Inc. for the Health Care Financing Administration, contract number 500-87-0028-10, November 29, 1990.

of a condition, the severity of the condition, and the intensity of treatment services utilized over time. The presence or absence of each disease cluster, along with age and sex, are used to assign a person to one of 51 ACG categories. The ability of ACG categories to predict the utilization of ambulatory health services within a particular population group was tested using computerized encounter and claims data from four large HMOs and a state's Medicaid program.<sup>40</sup> The results of this test indicated that ACGs could explain more than 50 percent of the variation in ambulatory resource use if used retrospectively and more than 20 percent if used prospectively. Age and sex, when used alone, were only able to explain six percent of the variation in ambulatory resource use.

Another research study, which was conducted for the Physician Payment Review Commission by Park Nicollet Medical Foundation and Johns Hopkins University, compared the ACG methodology to measures of self-reported health status and chronic health conditions.<sup>41</sup> The results of the study indicated that ACGs and self-reported health status measures performed equally well as risk adjusters for both individuals and groups.

In addition, the Medical College of Virginia and Mathematica Policy Research are conducting a study to refine the AAPCC by incorporating a variable corresponding to a person having a history of cancer, heart disease, or stroke. Other variables include: severity of the illness, length of time since the last hospital stay, and comorbidities. HMOs would be paid more for enrollees who had a history of cancer, heart disease or stroke and relatively less for other enrollees.

Other risk adjustment projects being conducted by HCFA's Office of Research and Demonstrations include: (1) update and revision of the DCG model

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<sup>40</sup> Jonathon P. Weiner, et al., "Development and Application of a Population-Oriented Measure of Ambulatory Care Case-Mix," Medical Care 29(5):452, May 1991.

<sup>41</sup> Jinnat B. Fowles, Jonathan P. Weiner, David Knutson, et al., A Comparison of Alternative Approaches to Risk Measurement, Selected External Research Series, Number 1 (Washington, DC: Physician Payment Review Commission, December 1994).

incorporating both inpatient and outpatient diagnoses, conducted by Health Economics Research, Inc., and Boston University, (2) development and testing of risk adjusters using ACGs and Medicare inpatient and ambulatory data, conducted by Lewin/VHI and Johns Hopkins University, (3) evaluating alternative risk adjusters for Medicare using measures of health status from the Medicare Current Beneficiary Survey (MCBS), conducted by the Center for Health Economics Research, (4) use of health status measures from the MCBS to improve the AAPCC, conducted by DataChron Health Systems, (5) development of global risk-assessment models, conducted by the Kaiser Foundation Research Institute, (6) risk adjustment of payment for mental health and substance abuse, conducted by Harvard Medical School (7) development of a risk adjustment system under health reform for the under-65 population, conducted by RAND, and (8) risk-adjusted models for the non-elderly, conducted by Boston University.

Each of the methodologies described previously, as well as most other prior utilization methods, add and/or delete variables in their attempt to refine the current AAPCC methodology. Although the models identified above have been shown to significantly improve the accuracy of the AAPCC methodology, even the best risk adjustment models are limited in their ability to account for variation in health care expenses across individuals.<sup>42</sup> Another limitation to the risk adjustment models described above is their focus on explaining variation in costs across individuals, rather than across groups of enrollees in health plans. As a result, the ability of these models to reimburse plans for the degree of favorable or adverse risk selection which they may experience, and the resulting effect on plan profitability, has often not been evaluated. In addition, many of the models described above rely

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<sup>42</sup> Some researchers have estimated that even a perfect risk adjustment formula would only be able to explain a small portion of variation in individuals' costs, perhaps 14.5% (Newhouse, et al., "Adjusting Capitation Rates Using Objective Health Measures and Prior Utilization," Health Care Financing Review 10(3):41, Spring 1989) to 20% (W. Pete Welch, "Medicare Capitation Payments to HMOs in Light of Regression Toward the Mean in Health Care Costs," in Richard M. Scheffler and Louis F. Rossiter, eds., Advances in Health Economics and Health Services Research 6:75 (Greenwich, CT: JAI Press, 1985)).

primarily on utilization and expenditure data reported for beneficiaries in the fee-for-service sector.

In summary, many efforts are underway to develop risk adjustment systems that are applicable to the Medicare population. Some of the risk adjustment methods will be tested in the HCFA demonstration projects that are currently being implemented.

#### 1.6 Proposed Legislative Changes to the Medicare Program

During the next year, the Medicare program faces perhaps the most significant changes since the program began operations in 1965. Sweeping changes to Medicare have been part of recent legislative proposals in both the Senate and the House of Representatives. These proposals were made partly in response to the projected insolvency of the Medicare trust fund by the year 2000 and other budgetary concerns, and partly in response to the preferences of the Republican legislative leadership in both houses of Congress. It is likely that final legislation passed later in 1995 will include major changes to the existing Medicare program. Proposals for changes to Medicare have included:

- Medical savings accounts
- Competitive bidding/pricing initiatives
- Voucher initiatives for purchase of private health insurance
- Expansion or modification of the Medicare risk program (i.e., addition of a self-referral or point-of-service option, incorporation of risk adjusters, etc.)
- Development of a new PPO contracting option
- Reduction of program costs through increased premiums and/or cost-sharing for the standard Medicare program

In addition, a variety of managed care initiatives have been proposed in the pending legislation and in recent HCFA demonstration projects. The managed care initiatives have focused on generating cost savings by using managed care plans to increase the degree of utilization management for Medicare enrollees and to take advantage of other cost containment mechanisms utilized by managed care plans (i.e., capitation of providers, delivering care

in the lowest cost setting, primary care gatekeepers, provider network management, economic incentives and risk-sharing arrangements, etc.). Features of proposals have included: permitting a wide variety of managed care organizations to contract with HCFA for Medicare enrollees, provision of reinsurance coverage with HCFA acting as reinsurer, allowing alternative payment methods and risk-sharing arrangements for managed care organizations and use of competitive bidding and competitive pricing approaches.

#### 1.7 Overview of New Demonstrations Sponsored by HCFA

In response to the proposed legislative changes for the Medicare program, HCFA has developed a number of new initiatives and demonstration projects. Three of these projects are directly related to payment methods for HMOs and other managed care organizations

- Medicare Choices Demonstration
- Medicare Outlier Pool Demonstration
- Medicare Competitive Pricing Demonstration

##### Medicare Choices Demonstration

In this demonstration, HCFA plans to provide Medicare beneficiaries with more choices of delivery systems using managed care organizations (MCOs). Participating health plans will also have a wider range of payment methods. The objective of this demonstration is to test the receptivity of Medicare beneficiaries to a broad range of health care delivery system options and to evaluate the suitability of such options for the Medicare program. The types of health care delivery systems that can apply for the demonstration include: preferred provider organizations (PPOs); open-ended HMOs; point-of-service options; integrated delivery systems; and primary care case management systems. In their applications, health plans can suggest a range of alternative payment methods and risk-sharing arrangements, including risk corridors, blended capitation and fee-for-service payments, and reinsurance for high-cost patients.



The demonstration is targeted to five metropolitan areas: Hartford, Connecticut; Philadelphia, Pennsylvania; Atlanta, Georgia; Jacksonville, Florida; New Orleans, Louisiana; Columbus, Ohio; Louisville, Kentucky; Houston, Texas; and Sacramento, California. However, applications are also being accepted from other areas. The target sites represent areas with high managed care penetration (non-Medicare) but relatively low Medicare HMO penetration. The demonstration is particularly interested in applications from health plans that offer to extend their networks to rural communities. HMOs currently contracting with Medicare are also eligible to participate in the demonstration under alternative payment arrangements.

To implement the demonstration, HCFA is using a two-stage application process. The first step is submission of an initial application, or a "pre-application statement of interest" by the health plan, including a brief description of the project. The pre-applications required the following information to be submitted regarding the proposed MCO arrangement:

- Nature of the proposed product (legal entity/authority)
- Major strengths of the organization and proposed model as they relate to HCFA's demonstration objectives
- Market area
- Provider network structure
- Benefits/copayment structure
- Description of quality improvement and assurance/utilization management programs (including specification of accreditation and by which organization).
- Proposed payment arrangements with HCFA and proposed financial arrangements with network providers
- Identification of who will head the demonstration and their qualifications
- Description of State licensure requirements and the organization's compliance with the applicable provisions
- Date when organization was originally established
- Number of affiliated physicians by specialty
- Number of hospital contracts
- Computerized data system capabilities for monitoring ambulatory and hospital utilization

- Is the MCO required to file financial reports on a quarterly or annual basis?
- What is the MCO's capacity for processing out-of-network claims?
- Type of financial arrangements with primary care physicians (fee-for-service, capitation, salary, etc.)
- Type of financial arrangements with specialists
- Type of reimbursement with hospitals (per diems, case rates, percent discount)
- Has your organization or parent organization ever had a Medicare risk contract?

The pre-applications were due to HCFA by August 11, 1995. A total of 375 pre-applications were received and reviewed by HCFA. Full proposals were requested from 52 bidders.

The second step in the application process involves completion of a full application by selected health plans. Based on a review of the pre-applications, HCFA identified health plans to receive a full application form for the demonstration. These applications were mailed to the selected managed care organizations in October 1995. Full applications were required to be submitted to HCFA by December 15, 1995. Decisions about sites to participate in the demonstration will be made early in 1996.

#### Criteria for Selection of MCOs to Participate in Demonstration

The criteria for selection of MCOs to participate in the Medicare Choices Demonstration are based on the eligibility requirements for HMOs and CMPs in the section 1876 Medicare risk contracting program. The selection criteria include the following:

1. Eligible Organizations. HCFA will consider applications from organizations that are legally constituted as HMOs, PPOs, and integrated delivery systems or other managed care or insurance models consistent with the licensure laws within their States.
2. Services Provided. The organization must be able to provide, through their own networks or through contractual arrangements with other providers, all Medicare Part A and Part B services available in the geographic area where

the organization's prospective enrollees reside. This would generally entail operating within a defined service area and limiting enrollment to Medicare beneficiaries residing in the specific service area served by network providers. However, HCFA may also consider proposals to include enrollment from geographic areas where there is limited access to the provider network (because of geographic remoteness, such as a rural area, or because there are only partial networks (as in the case of a PPO)).

3. Organization Experience and Enrollment. Currently, HMOs or CMPs with Medicare risk contracts are required to have at least 5,000 enrollees, and at least 50 percent of their members must not be Medicare or Medicaid beneficiaries. Organizations not meeting either of these requirements will need to demonstrate their significant experience in providing quality care to an eligible population for which the organization was at risk, and they will need to have in place (for the substitution for the beneficiary protections inherent in the 50/50 requirements) enhanced quality of care systems and evidence of sufficient financial viability to assume risk. Applicants must be willing to enroll any beneficiary entitled to Medicare Part A and Part B services living in the plan's service area, except for beneficiaries now excluded from HMOs such as beneficiaries with end stage renal disease.

4. Adjusted Community Rate. Applicants that intend to negotiate fully capitated payment arrangements with HCFA will be required to indicate how they will meet the section 1876 requirements that any profits in excess of the adjusted community rate must be returned to the beneficiaries in the form of lower premiums or a richer benefit package.

5. Quality Improvement and Assurance/Utilization Management. Prospective plans must describe to HCFA their approach to improving and assuring quality of care for Medicare beneficiaries, including: written quality assurance policies and procedures; a standing quality assurance committee; patient grievance and appeal systems; and a provider credentialing system. Applicants must also demonstrate their ability to promote effective patient care management through a variety of procedures available for managed care

organizations, such as provider selection, provider profiling, case management, and primary care gatekeepers.

6. Financial Solvency. Applicants must demonstrate that they are financially solvent and have sufficient assets and managerial and administrative capability to be able to assume full or partial risk with HCFA in providing care to enrolled beneficiaries. Risk may also be shared with others such as employers or insurers. Applicants must submit an audited financial statement to HCFA as evidence of their financial capability to participate in the demonstration.

7. Compliance with State Laws and Regulations. Applicants must be in compliance with State laws and regulations. Any activities undertaken in connection with the demonstration, including but not limited to the assumption of risk, cannot place the organization in conflict with State requirements.

8. Approach to Care Management for the Medicare Population. The applicants should either have experience managing care for Medicare beneficiaries, or describe their current experience that qualifies them to manage care for Medicare beneficiaries.

9. Incentives for Beneficiaries to Participate. The demonstration design should include incentives that will encourage Medicare beneficiaries to enroll in the demonstration, and once enrolled, to receive most of their care from demonstration providers.

10. Data Reporting Capabilities. Demonstration plans will be required to provide HCFA with quarterly reports summarizing enrollees' use and cost of physician services, inpatient hospital services, outpatient hospital services, skilled nursing facilities, home health care, and hospice services (plus a breakout of in-network and out-of-network services). Health plans will also be required to supply the following minimum data set for all services to enrollees: Medicare health insurance identification number, plan identification number, place of service, provider type, principal diagnosis code, secondary diagnosis code, principal procedure code, other procedure codes, date of service, date of admission, and date of discharge.

11. Marketing. Demonstration plans should be capable of marketing a Medicare demonstration delivery system plan to beneficiaries. Marketing materials for the demonstration will be subject to prior review by HCFA.

The applications submitted in December 1995 will be evaluated according to the above criteria, and MCOs will be selected to participate in the Medicare Choices Demonstration on that basis. In general, the selection criteria are based on the eligibility requirements for HMOs and CMPs in the section 1876 Medicare risk contracting program, with additional requirements for this demonstration.

#### Competitive Pricing Demonstration

The purpose of this demonstration is to test the feasibility of expanded health plan options for Medicare beneficiaries in a defined geographic area using a competitive pricing methodology to determine the HCFA payment rate. It is anticipated that a range of different delivery system options from managed care organizations will be offered to Medicare beneficiaries.

A contract has been awarded to assist implementation of the demonstration, including selection of geographic area(s), specification of qualification criteria, design of competitive pricing methodology, and development of data system requirements. The current schedule is for the demonstration to hold an open enrollment period in the Fall of 1996. Medicare eligibles will begin receiving services under the demonstration effective January 1997.

A critical component of a successful Competitive Pricing Demonstration is informed Medicare beneficiaries who understand the implications of their decision on choice of health plan. To assist the demonstration, HCFA is developing: (1) a marketing/public relations strategy to reach all beneficiaries in a defined market area and to inform beneficiaries of the enrollment process and new plan choices, (2) a strategy for beneficiary education and understanding about increased options under Medicare, and (3) a strategy to enable beneficiaries to choose effectively between new and

different types of insurance plans in an open enrollment process.

The design of competitive pricing methods is another key aspect of the demonstration. Health plans will submit proposals covering basic Medicare benefits and approved packages of supplementary benefits. It is necessary for HCFA to determine an appropriate payment method for health plans that participate in the demonstration.

#### HMO Outlier Pool Demonstration

In this demonstration, an outlier pool approach to risk adjustment is being tested. Since 1994 HCFA has sponsored an Alternative Payment Demonstration for Medicare risk contractors in selected geographic areas. The demonstration started in 1994 and was open to HMOs that were risk contractors in geographic areas with low Adjusted Average Per Capita Costs (AAPCCs). For 1994 the participating plans filed cost reports, and Medicare paid actual costs up to 100 percent of the AAPCC (average payment rate). In addition, Medicare shared 50 percent of the risk for HMO costs that were in the range of 100-105 percent of the AAPCC. Thus, participating plans were paid a maximum of 102.5 percent of the AAPCC if actual HMO costs equalled or exceeded 105 percent of the AAPCC.

HCFA held discussions with HMOs that expressed interest in participating in the 1995 demonstration, which was limited to the market areas defined as eligible for the 1994 Alternative Payment Demonstration (Seattle, WA; Portland, OR; Minneapolis/St. Paul, MN; and Rochester, NY). An additional criteria was that the market area must have at least three participating plans with risk contracts (or that could convert to risk contracts by January 1995). The market areas that met these criteria were Seattle, Portland and Minneapolis/St. Paul. Four HMOs in Seattle agreed to participate in the demonstration. A sufficient number of HMOs in the Minneapolis/St. Paul area did not agree to participate in the demonstration. Thus, Seattle is the site for the demonstration.

The operational parameters for the 1995 HMO Outlier Pool Demonstration

are as follows:

1. Duration of Demonstration. The demonstration would run for three years.
2. Pool Participants. Outlier pools would be organized by market area. Ideally, each pool would include all Medicare risk HMOs in a market area. The pool would not include plans from other areas. The minimum pool size would be three plans.
3. AAPCC Payment Limit. Payments would be increased to 97 percent of the AAPCC for participating plans.
4. Outlier Threshold. The threshold for determining outlier payments would depend on the percentage of payments that are placed in the pool.
5. Plan Contributions to High Cost Cases. In order to maintain incentives for the plans to constrain costs for high-cost cases, plans would be required to pay coinsurance on cases that exceed the threshold amount. For example, the pool payment for cases exceeding the outlier threshold may only be 40-60 percent of the actual cost of the case, with the plan paying the remainder. The actual percentage of coinsurance would be determined by the group of participating plans in each market area.
6. Uniform Costing System. A uniform costing system must be agreed upon. Medicare prospective payment and fee schedule would be appropriate for inpatient care and physician services, but a methodology for determining hospital outpatient, home health, and other Medicare costs would need to be developed.
7. Surpluses and Shortfalls. It is unlikely that the pool resources would correspond perfectly to the claims made. A system must be developed to account for potential pool surpluses and shortfalls at the end of the demonstration. Annual surpluses and shortfalls in the pool from a given year will be handled by readjusting the threshold for the following year and applying the shortages or surpluses from the previous year to the current year.

The HMO Outlier Pool Demonstration will operate during calendar years 1996 and 1997. The four HMOs from the Seattle area that are participating in

the demonstration will submit claims for outlier payments and receive payments from the outlier pool that is funded by the ACA contributions based on two percent of the AAPCC payments to the participating plans.

#### 1.8 Objectives of this Study

The major goal of this study was to evaluate alternative payment methods for HMOs and competitive medical plans (CMPs) that were participating in the Medicare risk contracting program. Since the beginning of the risk program, participating plans have been paid according to the Adjusted Average Per Capita Cost (AAPCC) payment method. The AAPCC is based on 95 percent of the cost in the fee-for-service sector. The AAPCC is adjusted for the following factors: age, gender, Medicaid status, institutional status, working aged status, aged/disabled/ESRD status, and county of residence. The advantages and limitations of the AAPCC payment method were discussed earlier in this chapter.

To evaluate alternatives to the AAPCC, four alternative payment methods have been investigated in this study:

- Partial capitation
- Reinsurance
- Experience rating
- Select and ultimate rates

#### Partial Capitation

One alternative payment method which could be used in the Medicare risk program is partial capitation. Partial capitation involves payment of some services on a predetermined capitated basis and payment for the remaining covered services on a cost basis. HMOs and other MCOs frequently make payments to participating physicians for some subset of services, such as primary care services, on a capitated basis and pay for hospital and surgical services on a fee-for-service basis. The primary care providers may be subject to some penalty if the surgical and hospital services exceed some



preset limit or may get a reward if those services fall below limit. The HMO's objective is to shift some manageable risk to physicians and also to encourage them to order other services judiciously.

The current AAPCC approach for the Medicare risk program places all the risk on the HMO and thus provides great opportunity for gain or loss. This gain or loss could be the result of good or poor management, but could also be due to random or intentional risk selection. The advantages of including all services in the capitation is that it provides the HMO with incentives and opportunities to manage care by seeking low-cost alternatives to expensive inpatient services, and it provides incentives to improve preventive care services and to reduce the use of expensive and unnecessary technologies. One partial capitation approach suggested for the Medicare risk program would have Medicare pay a capitation amount of 60 percent, while reimbursing the HMO 40 percent of the actual cost of services delivered.<sup>43</sup> For a person using no services, the HMO would only receive the capitation amount. For a person with catastrophic expenses, the HMO would receive the capitation amount plus 40 percent of incurred expenses. As a result, the HMO would profit less from enrolling healthy individuals, but would be penalized less from enrolling sicker individuals.

#### Reinsurance

A second alternative payment method is reinsurance, with the Medicare program acting as the reinsurer. This method is similar to the partial capitation method in that it seeks to limit the part of expected plan cost that is capitated and thus subject to risk and reward. One approach would have Medicare pay for all or part of the expenses above a certain limit for each individual enrollee out of a reinsurance pool. The reinsurance pool would be funded by reducing the capitation amount paid for each HMO enrollee.

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<sup>43</sup> Joseph P. Newhouse, Capitation and Medicare, report to the Health Care Financing Administration, No. R-3455-HCFA (Santa Monica, CA: Rand, October 1986) and Joseph P. Newhouse, "Patients at Risk: Health Reform and Risk Adjustment," Health Affairs 13(1):132, Spring (Part I) 1994.

For enrollees with expenses below the predefined limit, the HMO would receive a lower capitation amount than under the AAPCC methodology. For enrollees with expenses above the limit, the HMO would receive the lower capitation amount plus some percentage of all expenses exceeding the limit. The percentage of expenses above the limit reimbursed by the Medicare program could be set at less than 100 percent to provide the HMO with some financial stake in managing its high-cost cases.

HCFA is currently planning to test this reinsurance approach in its outlier pool demonstration. Four HMOs in the Seattle area are scheduled to participate in the demonstration. These plans will be paid at 95 percent of the AAPCC, with an additional two percent of the AAPCC paid into an outlier pool by HCFA. The participating plans will be allowed to make claims against the pool to pay for high cost cases that exceed a predetermined threshold. The HMOs will be required to pay coinsurance on the amount above the threshold for each case to maintain incentives for the plans to manage their high cost cases. This approach appeals to the plans because it allows them to be reimbursed more than 95 percent of the AAPCC for their enrollees. The primary appeal to HCFA is that it can test a payment methodology which could eliminate some of the incentives for risk HMOs to enroll healthier individuals present under the current payment system.

#### Experience Rating

A third alternative payment method is prospective experience rating. Experience rating has generally been the method of choice for insurers of large groups in the private sector. Under retrospective experience rating, a financial settlement is made with the insured group after the close of the plan's fiscal year to adjust for differences between actual costs and costs anticipated in setting the premium rate charged during the year. Cost HMOs under Medicare are reimbursed on a retrospective experience rating basis. Some analysts believe that this provides little incentive for the plans to operate efficiently since all costs are simply passed through to the payer.

Some HMO have also objected to retrospective experience rating because of the unpredictable cash flows resulting from retroactive adjustments.

Under prospective experience rating, the group's per person cost in a prior year is trended forward and used to set the premiums for the application year. Retroactive adjustments are not made under prospective experience rating. Thus, the insurer is at risk for any costs in excess of those anticipated in the premium rate, and the insured group is at risk when costs fall below projections. In practice, gains and losses in a prior year may be built into the premiums for the next few years' premium rates, presumably evening out in the long run. The result is a guaranteed cash flow for any given year with actual costs being recognized eventually.

#### Select and Ultimate Rates

A fourth alternative payment method is select and ultimate rates. This approach might be thought of as one-time prospective experience rating by entry cohort. Select and ultimate rates are commonly used in life and health insurance. They reflect the observation that mortality and morbidity are lower when individuals and groups are first insured because of the insurer's admission requirements. These vital rates are then assumed to rise in a predictable pattern as a function of age and duration since policy issue. The process is essentially the same as regression to the mean.

A risk HMO's enrollment process can be viewed as a selection process, either favorable or unfavorable. After a few years, the selection effect appears to wear off. For those enrollees beyond the selection period, the experience should be typical of other Medicare enrollees of the same AAPCC category except for the influence of the HMO.

The costs of an entry cohort during the select period can be considered as following a trajectory between their initial experience in the HMO and the ultimate rate. Ideally, their experience would be measured before they enter the HMO, but this may not be practical administratively. If the path of regression to the mean can be shown to be sufficiently predictable, an initial

experiential rating for the cohort would be adequate to estimate their future expected cost in the fee-for-service sector.

For each of the four alternatives described above, specific payment methods were formulated for the Medicare program. Combinations of rate methods, using two or more of the four basic methods, were also investigated. These methods were then tested and evaluated through comparison to the basic AAPCC method and the other alternatives. Data from both the Medicare fee-for-service program and from an HMO data source were used in development and evaluation of the alternative methods. The results of the analysis of the four alternative payment methods are provided in Chapters 2 to 5.

A simulation model was developed to assist in comparison of the alternative methods. The results of comparison of the four alternative payment methods and the basic AAPCC method are presented in Chapter 6.

#### 1.9 Data Sources

Two main data sources were used in this study: (1) data from the Continuous Medicare History Sample File (CMHS), and (2) demographic, utilization and cost data from an HMO. Each of these data sources is described below.

##### Continuous Medicare History Sample File (CMHS)

Information on Medicare utilization and costs were obtained from the CMHS. The CMHS provides a combined summary record of all Medicare activity by calendar year. For the purposes of this study, data from 1992 were used to analyze the effectiveness of the partial capitation models tested.

The CMHS file is prepared on a five percent sample person basis and represents all beneficiaries regardless of utilization activity. The selection of sample beneficiaries is derived from the Master Enrollment File. The CMHS for the most current year includes newly entitled beneficiaries and those previously selected from prior enrollment files. There are approximately 1.6 million persons represented on the CMHS.

Utilization data for each year are selected from the inpatient hospital, skilled nursing facility (SNF), home health services (HHS), and outpatient bills that are processed by intermediaries. Physician service information is obtained from payment records that are processed by carriers.

A variety of demographic, utilization and cost data is available from the CMHS. Selected personal characteristics are obtained from the HISKEW files. A demographic record is added each year the enrollee is alive. The status and coverage characteristics are based as of July 1 of the reference year.

The types of utilization records used to obtain CMHS information are as follows:

1. Inpatient hospital stay records represent complete stays and are sequenc d by date of discharge. Multiple inpatient hospital stays for a beneficiary are included in the file. (Approximately 500,000 records per year.)
2. Inpatient SNF stay records represent either complete or incomplete stays and are sequenced by date of discharge. An incomplete SNF stay record is replaced in subsequent updates by a complete stay record when the discharge record for that stay has been processed. (Approximately 20,000 records per year.)
3. Home health agency, outpatient, and payment records are summarized by type of record on a calendar year basis and included in the annual update of the CMHS. (Approximately 1 million records per year.)

Two additional source files are used to annotate the CMHS sample records with information relating to third party and group practice prepayment plan (GPPP) activity. These data are obtained from the State Buy-In and GPPP member files annually, and identify those CMHS beneficiaries ever enrolled in the reference year as a State Buy-In and/or a member of a GPPP.

The complete CMHS record varies in size, based on whether Medicare utilization is present or not, type of service(s) utilized by the beneficiary, and the number of years involved. The file is maintained in chronological sequence by type of record and by date(s) of service.

#### HMO Data

The second source of data for the study was demographic, utilization and cost data from a single HMO. A demographic record was submitted by the HMO for each Medicare beneficiary enrolled in the plan for any period of time in 1990, 1991, or 1992 (approximately 50,000 members). These records indicated the member's ID number, gender, age, zip code and county of residence, enrollment date, termination date (if applicable), and date of death (if applicable). The demographic information for each HMO member was then merged with utilization and cost data which was summarized for each calendar year (1990 - 1992) the member was enrolled in the plan. The summary utilization and cost data was derived from separate files containing individual records for each inpatient admission and for each ambulatory encounter. The data for each inpatient admission included date of admission, date of discharge, diagnosis codes, and total cost. The data for each ambulatory encounter included date of service, diagnosis and procedure codes, and total cost.

## Chapter

### Partial Capitation

Increased interest in capitated coverage arrangements under the Medicare program has led to consideration of alternative methods to reduce the risk imposed on contracting health plans in an effort to attract more contractors and to reduce the threat of insolvency. One such alternative is partial capitation, which redistributes risk by removing (partially or totally) certain individuals, services, or cost liabilities relative to a fully capitated system. Under the general term partial capitation, a variety of methods are also available whereby contracting plans and HCFA would share the gains or losses associated with actual plan experience. This chapter presents several generic methods of partial capitation and ways to implement them, discussing the advantages and disadvantages of each from the perspective of potential contracting plans and the federal government. Our analysis of alternative types of partial capitation systems is also discussed in this chapter.

#### 2.1 Examples of Partial Capitation Systems

A number of partial capitation systems have been implemented under various health care programs. This section provides examples of systems which have been implemented under Medicaid and in the private sector, examples of systems which could be implemented under Medicare, and a discussion of the advantages to HCFA of implementing a partial capitation system for the Medicare risk program.

Generally, partial capitation involves payment of some services on a predetermined capitated basis and payment for remaining covered services on a cost basis. For example, HMOs, especially Individual Practice Associations (IPAs), frequently make payments to participating physicians for some subset of services, such as primary care services, on a capitated basis and pay for hospital and surgical services on a fee-for-service basis. The primary care

provid may be subject to some penalty if the cost of surgical and hospital services exceeds some preset limit or may get a reward if the cost for those services falls below a limit. The HMO's objective is to cede some manageable risk to physicians and also to encourage them to order other services judiciously. Such a system differs from the current Medicare approach, which places all the risk on the HMO, thereby subjecting the plan to the possibility of substantial gains or losses. As a result, the plan's financial experience is determined by its ability to manage care, as well as by the degree of selection the plan encounters during the enrollment and disenrollment processes.

Partial capitation is one of the two frameworks which has been used to incorporate a variety of physician risk arrangements into a number of state Medicaid programs to contain costs.<sup>1</sup> Partial capitation systems used by state Medicaid programs are an example of redistributing risk by removing certain services relative to a fully capitated system (e.g., primary care case management programs). Medicaid programs using partial capitation make a monthly payment to primary care physicians (or physician groups) to cover the physician's own services and usually outpatient lab tests and x-ray procedures. Primary care services provided during a hospital stay and the services of specialists may also be covered. However, the payment never covers other inpatient or outpatient hospital services. The exclusion of hospital costs from the package of services being capitated reduces the risk associated with capitation to providers and allows each state to include many more providers than would be possible under a full capitation model.

One limitation of partial capitation methods is that the incentive to contain the cost of inpatient hospital and other non-capitated services is reduced. Because the health plan is not financially responsible for non-capitated services, provider behavior may tend to resemble a fee-for-service

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<sup>1</sup> In 1990, 4 states (California, Michigan, New Jersey, and Oregon) were using partial capitation programs for Medicaid eligibles. For a description of the 2 largest programs, in California and Oregon, see W. Pete Welch, "Giving Physicians Incentives to Contain Costs Under Medicaid," Health Care Financing Review 12(2):103, Winter 1990.



environment. With respect to the Medicare program, partial capitation models for HMOs would still rely on FFS sector data to set prospective payment rates for participating plans, but the actual experience of HMOs would be examined to make retrospective adjustments or payments to the plans. Figures 2-1 and 2-2 illustrate how a basic partial capitation system would reduce financial risk for health plans participating in the Medicare program. Figure 2-1 shows how profits and losses are related to actual plan cost under full capitation. The profits and losses per capita, expressed as a percentage of the full capitation rate, are shown as a function of the prospective payment rate. Under full capitation, the prospective payment rate is equal to the full capitation rate. Thus, the plan's profit is zero if the plan's actual cost per capita is exactly equal to the prospective payment rate paid by the government to the health plan.

The relationship of profits and losses to the actual plan cost as a measure of the prospective payment rate is simple: profits per member per month (PMPM) are increased dollar for dollar to the extent that the actual plan cost PMPM falls below the prospective payment rate and losses increase to the extent that actual plan cost PMPM is higher than the prospective payment rate. These potential operating results form a 45 degree line through the point of zero profit/loss.

Figure 2-2 shows the impact of partial capitation with the prospective payment rate to the plan equal to 50 percent of the full capitation rate. The remaining 50 percent of the full capitation rate would be paid on a cost basis by the government. Under this system, the profit or loss as a percentage of the full capitation rate is cut in half at each ratio of actual plan cost to the prospective payment rate. For simplicity of exposition, it is assumed that the measure of plan cost is a fully realistic measure, i.e., the ratio of actual cost to the prospective payment rate is the same as the ratio of the measure used in the payment to determine plan costs. (To the extent that the measure used of plan costs is biased downward, i.e., by excluding or failing to recognize components of cost, the profit/loss line would be shifted to the

Figure 2-1

Profits or Losses as Function of Plan Costs: Plan at Full Risk  
Expressed As Percent of Full Capitation Rate

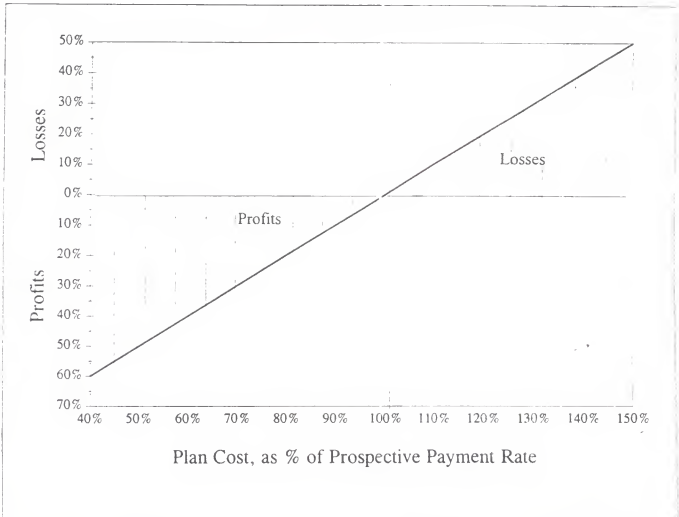
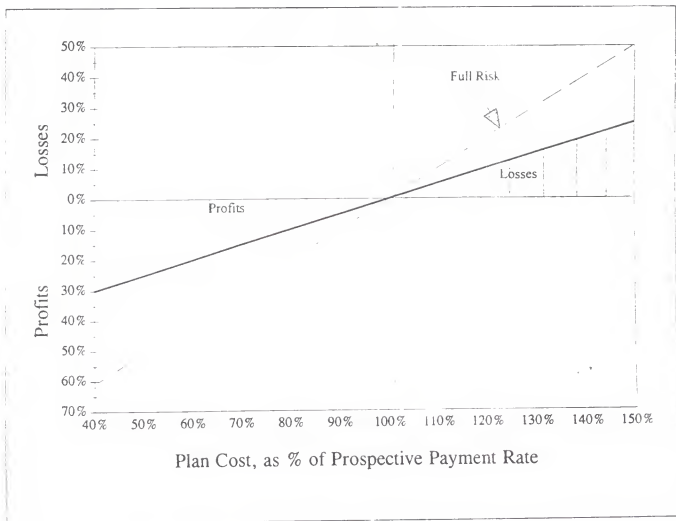


Figure 2-2

Profits or Losses as Function of Plan Costs: 50% Pure Partial Capitation  
Expressed As a Percent of Full Capitation Rate



left, so that the break even point is to the left of the 100 percent line. The profit is reduced at each ratio of plan cost to full capitation rate by half of the bias in the measure of plan costs.)

Partial capitation can be combined with various other risk-sharing methods. For example, partial capitation could be used either with or without prospective experience rating. In the former case, HCFA's payments for the risk borne by the prepaid plan would be based on the plan's own experience, while in the latter case, HCFA's payments would be based on the current AAPCC methodology.

Partial capitation models can be designed to deal directly with the aggregate cost experience of HMOs, or to introduce risk sharing on an individual enrollee basis.<sup>2</sup> An example of a model dealing with the aggregate cost experience of HMOs is one where HCFA would enter into aggregate risk-sharing arrangements with HMOs, constraining the savings or losses to HMOs according to some specified risk corridor or formula. The risk corridor is a very flexible approach, since the size of the corridor and the sharing of profits and losses inside and outside the corridor can be varied. Capitating physician groups for the provision of Part B services and for the management of Part A services, while HCFA pays institutional providers directly, is another example of aggregate risk sharing. Such a model might enable many physician provider groups who can not currently qualify as competitive medical plans (CMPs) to enter the risk program.

One example of risk sharing on an individual enrollee basis is a payment model which pays providers a reduced amount prospectively, while making them responsible for a certain fraction of all medical costs, to be paid retrospectively.<sup>3</sup> For example, a health plan could be paid 60 percent of its normal capitation amount prospectively, with retroactive payment of 40 percent

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<sup>2</sup> Leonard Gruenberg, et al., "Pricing Strategies for Capitated Delivery Systems," Health Care Financing Review, 1986 Annual Supplement, pp. 35-44.

<sup>3</sup> Randall P. Ellis and Thomas G. McGuire, "Provider Behavior Under Prospective Reimbursement: Cost Sharing and Supply," Journal of Health Economics 5(2):129, June 1986.

of actual costs incurred.

An alternative method uses an individual stop-loss approach for Part A costs only, with a low outlier threshold (about \$5,000).<sup>4</sup> HMOs continue to have responsibility for a proportion (e.g., 25 percent) of those costs exceeding the threshold, in order to maintain incentives for cost-effective treatment. Such a threshold could be increased to cover a defined multiyear period, so that only chronically ill, repeatedly hospitalized patients would be likely to exceed the threshold. This approach would be especially useful in reimbursing HMOs which suffer from adverse selection.

Another approach for risk sharing on an individual enrollee basis refers high-cost individuals out of a capitated risk pool into another managed care environment that specializes in purchasing or managing care for such cases, while at the same time reducing the payment rate for HMOs by excluding high-cost beneficiaries from the insurance pool.<sup>5</sup> A variation on this approach reduces the HMO's reimbursement rate but pays the HMO separately for hospitalizations (a DRG amount) associated with certain catastrophic illnesses. In some respects, partial capitation introduces some aspects of experience rating into the reimbursement of HMOs, since some of the costs incurred by participating plans are adjusted or paid retrospectively.

Partial capitation would permit HCFA to limit the risk of HMOs with Medicare risk contracts in exchange for a number of benefits. First, HCFA would be able to keep a greater percentage of the savings generated by HMOs with risk contracts. Under the current system, savings generated by participating HMOs are controlled by the plans (except for the assumed 5 percent savings resulting from reimbursing plans at a rate of 95 percent of the AAPCC). Second, the limitations on risk resulting from partial capitation could encourage more HMOs to participate in the risk contract program,

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<sup>4</sup> John P. Cookson, Final Report - Review of AAPCC Methodology for Implementing Prospective Contracts with HMOs, prepared for the Health Care Financing Administration, contract number 500-38-0018, August 1983.

<sup>5</sup> Stanley S. Wallack, et al., "A Plan for Rewarding Efficient HMOs," Health Affairs 7(3):80, Summer 1988.

especially smaller plans and those operating in rural areas. Third, partial capitation may offer a better opportunity to balance conflicting incentives for providers, i.e., to control costs and to provide adequate quality of care to enrollees. Perhaps most importantly, it could help to offset the effects of biased selection, which would benefit HCFA and participating HMOs.

## 2.2 Description of Partial Capitation Systems Analyzed for this Study

Thirteen types of partial capitation systems were analyzed for this study. Five of the models tested involve risk sharing on an individual enrollee basis. The first of these systems, Model 1, would fully capitate the HMO's outpatient (part B) expenses for each enrollee, using a prospective monthly payment equal to the AAPCC rate for Part B services, while actual inpatient (Part A) expenses would be fully reimbursed on a retrospective basis. As a result, the HMO would be fully at risk for the cost of Part B services utilized by its enrollees, while HCFA would be fully at risk for the cost of Part A services utilized by the HMO's enrollees.

Models 2 through 5, which are also based on individual enrollee risk sharing, would also fully capitate part B expenses, as well as inpatient expenses which do not exceed various pre-determined amounts (\$5,000; \$10,000; \$15,000; \$20,000; respectively) per person per year. The prospective monthly payment under these systems would equal the AAPCC rate for Part B services plus the actuarial value of all inpatient expenses below or equal to the pre-determined threshold. Inpatient expenses exceeding the specified threshold would be fully reimbursed by HCFA on a retrospective basis. This feature of the system incorporates a basic form of reinsurance.

Reinsurance can be designed in a number of different ways. Many reinsurance plans purchased by HMOs reinsure a high percentage (e.g., 90 percent) of the inpatient hospital expense incurred for any single patient during an annual period. Expenditures for all services or for any subset of services (e.g., physician services) can be covered by reinsurance. The threshold at which the reinsurance assumes responsibility for payment may be

set as low as \$5,000 or as high as \$100,000 or more). Thresholds of \$50,000 to \$75,000 are the most common. This type of reinsurance is referred to as "individual" or "specific" stop-loss reinsurance. Private reinsurance can also be purchased that would pay total costs in excess of some aggregate or per capita amount, which is referred to as "aggregate reinsurance."

The primary advantages of reinsurance are to remove an important source of fluctuation in the cost to health plans of providing care and to provide protection against catastrophic claims. By itself, however, reinsurance does not effectively limit a health plan's losses except those related to catastrophic claims. Relatively large aggregate losses can occur without many catastrophic claims, especially if the level of operating expenses of a health plan proves to be higher than the level of the payment rate. Thus, a plan sponsor or regulator will not have the assurance of a preset maximum possible loss.

The eight additional partial capitation systems tested involve aggregate risk sharing using risk corridors. The first group of these systems, Models 6 through 9, use a risk corridor equal to 20 percent of the prospective payment rate for capitated services and a 50 percent risk-sharing rate. Under such a system, rather than paying the HMO the prospective payment rate and holding the plan responsible for all costs for capitated services, there would be a corridor of plus or minus 20 percent of the prospective payment rate, in which the plan would bear only half of a loss or retain half of the profits. Outside of the risk corridor, if the plan's actual cost exceeded 120 percent of the government payment rate for capitated services, the plan would bear the full cost rather than half of the excess costs. Similarly, the plan would retain any additional savings if actual costs fell below 80 percent of the prospective payment rate for capitated services.

An example of such a system is provided below. Assume that the prospective payment rate for capitated services was \$100 per member per month (PMPM) and the actual plan cost PMPM was as shown below. The difference between the prospective payment rate and the plan cost would be shared as

follows:

<u>Actual Plan Cost</u>	<u>Plan Profit/(Loss)</u>	<u>HCFA Profit/(Loss)</u>	<u>Actual Plan Revenue after Risk sharing</u>
\$ 75	\$15	\$10	\$ 90
\$ 90	\$ 5	\$ 5	\$ 95
\$100	\$ 0	\$ 0	\$100
\$110	(\$ 5)	(\$ 5)	\$105
\$125	(\$15)	(\$10)	\$110

Obviously, at least within the risk corridor, the degree of risk sharing can be set at any level desired by setting the primary parameters: (i) the range of the risk-corridor (in this example 20 percent), and (ii) the risk-sharing rate (in this case 50 percent).

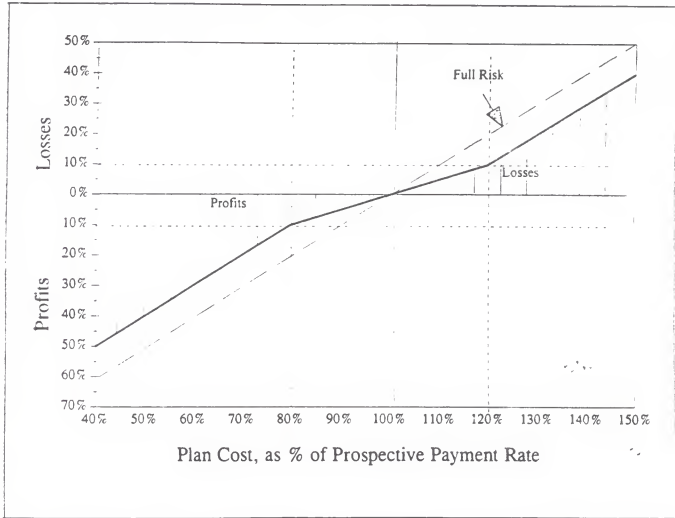
Figure 2-3 shows the relationship of the profit or loss of an HMO to the ratio of actual cost to the prospective payment rate for capitated services with a 20 percent risk corridor and 50 percent risk-sharing rate. In the range from 80 percent to 120 percent of the prospective payment rate, the plan's profits and losses are cut in half compared to full capitation. However, outside of the risk corridor, profits are retained and losses are incurred on a dollar for dollar basis. This produces a profit/loss line in Figure 2-3 that has the same slope as the 50 percent partial capitation model shown in Figure 2-2, but slopes at 45 degrees outside of the corridor.

Models 6 through 9 are basically the same as Models 2 through 5, except that the type of risk corridor described above is combined with the partial capitation systems used in the previous models. For each of the new models, the risk corridor is constructed around the prospective payment rate for capitated services in Models 2 through 5.

The second group of aggregate risk-sharing models tested represent capped risk corridor models. These systems (Models 10 through 13) are identical to Models 6 through 9, except that beyond the risk corridor in which the health plan and HCFA share gains or losses at 50 percent each, the Government retains 100 percent of any profit and pays full plan costs which exceed the risk



Figure 2-3  
 Profits or Losses as Function of Plan Costs: 20% Risk Corridor  
 Expressed As a Percent of Full Capitation Rate



corridor. With a capped risk corridor and a maximum on enrollment accepted, there is a predetermined maximum loss a health plan could suffer in a given year.

Again, suppose that the prospective payment rate for capitated services was \$100 PMPM and actual plan cost PMPM was as shown below. The difference between the prospective payment rate and the plan cost would be shared as follows:

<u>Actual Plan Cost</u>	<u>Plan Profit/(Loss)</u>	<u>HCFA Profit/(Loss)</u>	<u>Actual Plan Revenue after Risk sharing</u>
\$ 75	\$10	\$15	\$ 85
\$ 90	\$ 5	\$ 5	\$ 95
\$100	\$ 0	\$ 0	\$100
\$110	(\$ 5)	(\$ 5)	\$105
\$125	(\$10)	(\$15)	\$115

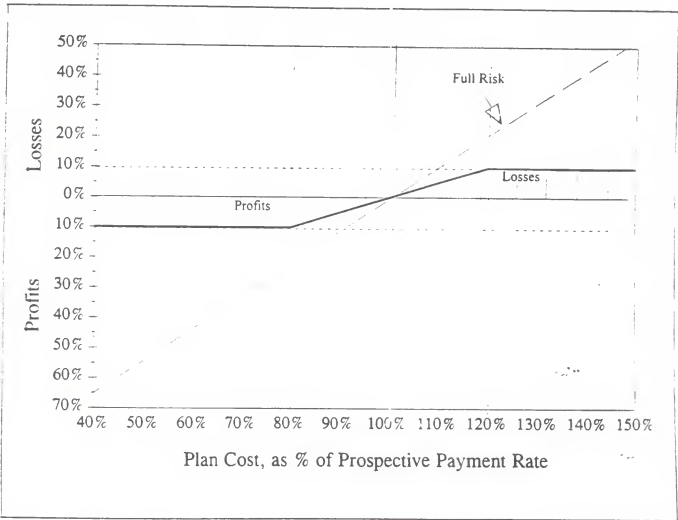
With the cap on potential losses, the degree of risk sharing can be set at any level desired by setting the primary parameters: the range of the risk corridor and the risk-sharing rate. Figure 2-4 shows how profits and losses would be affected by capping the risk under such a system.

The relative effectiveness of each partial capitation model tested during this study is discussed later in this chapter, following descriptions of the data sources and methods used to conduct the analysis.

### 2.3 Method of Analysis

The primary method of analysis used to evaluate the various payment systems described above was a simulation model. The model calculates goodness-of-fit statistics for each payment method using a two-stage process. During the first stage, actual costs and estimated payments (based on the respective payment method) are calculated for each group. During the second stage, the actual and predicted costs are used to calculate statistics that measure the accuracy of each payment method for the defined groups. The simulation model was used to conduct separate analyses of the Medicare (CMS)

Figure 2-4  
 Profits or Losses as Function of Plan Costs 20% Capped Risk Corridor  
 Expressed As a Percent of Full Capitation Rate



data and the HMO data described above.

The first stage of the analysis consisted of constructing various groups of beneficiaries stratified by size of the group and relative cost of the group (i.e., low cost, average cost, high cost). Each person-level record in the datafile was read and the record was assigned to a group based on the individual's location of residence (e.g., state, county, and zip code). After placing the person in a group, demographic and financial information were used to determine the person's actual costs in 1992 and their estimated payments in 1992 based on each of the payment methods. For each group of beneficiaries, the actual costs and estimated payments are accumulated across the group's members. After assigning every record to a group, the accumulated actual costs and estimated payments for each group are divided by the group's total member months, generating the group's average actual cost PMPM and average estimated payment PMPM.

Both aged and disabled beneficiaries in the CMHS file were used to construct groups based on Medicare data. Persons who died during 1992 are included in the groups specified by the selection criteria. Beneficiaries with end stage renal disease and HMO enrollees are excluded from the groups constructed from the CMHS data.

To evaluate the robustness of the results, groups were constructed using four different approaches:

- (1) development of groups based on random selection of persons from the CMHS file,
- (2) development of groups according to the residence of persons in the CMHS file by defined geographic areas (i.e., counties, metropolitan areas, states),
- (3) development of groups based on random selection of persons from the HMO data file, and
- (4) development of groups according to residence of persons in the HMO data file by five digit zip code area.

In addition to using different data sources and grouping methods to evaluate the robustness of the results, six different group sizes were used in the analysis: 500; 1,000; 2,500; 5,000; 10,000 and 20,000. For the randomly selected groups, 200 groups of each size were generated by the simulation

model. For the groups formed by geographic area, the number of groups was determined by the number of persons residing in each area. There were a total of 342 geographic-based groups from the CMHS file and 120 geographic-based groups from the HMO file.

There are advantages and disadvantages for each method of group formation. Geographic-based groups formed with data from a large number of HMOs would probably provide the most realistic simulation of payment methods to HMOs. However, the HMO data used in this study was confined to a single HMO and a limited number of geographic groups. There were substantially more geographic groups formed using the CMHS data, but there was still a limited number of groups, especially for the larger group sizes. There were a sufficient number of randomly-selected groups (200 of each size). However, random selection is the least preferable method of group formation, given the nature of HMO enrollment groups. The statistical results are presented for all four types of data in the next section of this chapter.

The second stage of the analysis calculated statistics that measure how well the estimated payments fit the actual costs. Subjects of groups were selected based on group size and relative cost and various statistics were calculated for each subset. It should be noted that the statistics are based on groups and not individuals.

Seven statistics are used to evaluate the alternative payment methods:

(1) mean absolute value of error in estimated payments, (2) mean absolute value of percent error in predictive ratio, (3) percent of groups with error less than 5 percent, (4) percent of groups with error greater than 10 percent, (5) product moment correlation, (6) R-square, and (7) mean squared error as a percent of mean prospective payment. These statistics measure different aspects of the relative accuracy of each payment method.

1. Mean absolute value of error in estimated payments. This statistic is expressed in dollars and measures the error in estimated payments in terms of the absolute value of the difference between actual costs and estimated payments for each group.

2. Mean absolute value of percent error in predictive ratio. The predictive ratio for each group is the ratio of estimated payments to actual costs. This statistic measures the error in estimated payments as the absolute value of 1.0 minus the predictive ratio of each group. It is expressed as a percentage with zero error being the objective.
3. Percent of groups with error less than 5 percent. For a particular group size, this statistic represents the proportion of groups that have less than 5 percent error between estimated payments and actual costs.
4. Percent of groups with error greater than 10 percent. Groups that have more than 10 percent difference between actual costs and estimated payments are indicative of poor performance by a payment method. This statistic measures the proportion of groups that have more than 10 percent error.
5. Product moment correlation. This statistic is computed as the covariance of estimated payments and actual costs, divided by the product of the variance of estimated payments times the variance of actual costs. Thus, it measures the degree of correlation between estimated payments and actual costs.
6. R-square. The normal R-square statistic is a product of a least squares regression, and it is equal to 1.0 minus the ratio of the sum of squares of the residuals to the total sum of squares. In this study, the variables are actual costs and estimated payments (that can be viewed as predictions of actual costs). We maintain the same formula for R-square as above. However, it should be noted that negative values of R-square are possible and occurred in a few cases. These cases are noted in the tables of statistical results, and the standard correlation coefficient is reported in those cases. In most cases, the reported R-square values are slightly lower than the corresponding correlation coefficients.
7. Mean squared error as a percent of mean prospective payment. This statistic is calculated as the square root of mean squared error (average square of the residual between actual costs and estimated payments) divided by the average prospective payment. The average prospective payment is the proportion of the average payment to the health plan that is paid on a

prospective basis.

The results of the analysis for the thirteen partial capitation models described earlier in this chapter are presented in the next section.

#### 2.4 Analysis Results

This section presents the results of the analysis with respect to the effectiveness of various partial capitation systems to predict actual plan costs. The effectiveness of the partial capitation systems is also compared to the effectiveness of the current AAPCC method and a revised AAPCC method. The revised AAPCC system tested combines the current AAPCC methodology with aggregate risk sharing through the use of risk corridors. This system uses three corridors, with the first being equal to  $\pm 3\%$  of the AAPCC. Within this range, the health plan would be responsible for all gains and losses. The next corridor ranges from  $\pm 3\%$  of the AAPCC to  $\pm 20\%$  of the AAPCC. Within this range, losses or profits would be split evenly by the health plan and HCFA. The final corridor is any costs greater than  $\pm 20\%$  of the AAPCC, where profits (or losses) would be fully retained (or absorbed) by HCFA.

Results are first presented for Models 1 through 5 using the four analysis sets determined by type of data and type of group formation. The next set of results also focuses on Models 1 through 5 by analyzing their effectiveness with respect to low-cost and high-cost groups within each group size, using CMHS data with geographic groups. Finally, results are presented for Models 6 through 13 using the CMHS data with geographic groups.

##### Results by Type of Data, Method of Group Formation, and Group Size

Table 2-1 provides a summary of comparison statistics calculated for five partial capitation systems and two systems based on the AAPCC methodology using CMHS data and geographic groups. The seven statistical measures described earlier were used to compare the effectiveness of the various systems and each statistic is shown for six different group sizes ranging from 500 beneficiaries to 20,000 beneficiaries, as well as for all groups combined

Table 2-1

Summary Comparison Statistics, by Group Size, for Partial  
Capitation Models Using CMHS Data and Geographic Groups

	AAPCC	Partial Capitation Models *					Modified AAPCC**
		1	2	3	4	5	
<u>Mean Absolute Value of Error in Predicted Payments</u>							
500 (N=185)	\$38	\$11	\$17	\$22	\$26	\$29	\$21
1,000 (N=56)	28	9	16	20	22	24	17
2,500 (N=52)	28	9	18	23	25	26	19
5,000 (N=20)	22	8	19	21	22	22	15
10,000 (N=18)	18	5	13	15	16	16	13
20,000 (N=11)	17	4	12	16	18	19	12
All Groups (N=342)	32	10	17	21	24	26	19
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>							
500	13%	4%	6%	8%	9%	10%	7%
1,000	9	3	5	6	7	7	5
2,500	9	3	6	7	7	8	6
5,000	7	3	6	7	7	7	5
10,000	6	2	4	5	5	5	4
20,000	5	1	3	5	5	6	4
All Groups	11	3	5	7	8	9	6
<u>Percent of Groups with Error Less than 5 Percent</u>							
500	24%	71%	51%	41%	37%	32%	37%
1,000	43	86	70	63	54	48	54
2,500	44	81	58	48	46	44	54
5,000	35	90	50	45	45	40	45
10,000	61	94	72	50	56	56	78
20,000	64	100	73	64	55	55	73
All Groups	34	78	57	47	43	39	46
<u>Percent of Groups with Error Greater than 10 Percent</u>							
500	52%	4%	18%	31%	35%	44%	20%
1,000	29	0	18	16	18	25	9
2,500	42	0	21	31	35	37	15
5,000	25	0	10	25	30	30	5
10,000	17	0	6	6	6	11	0
20,000	27	0	0	9	9	18	0
All Groups	43	2	17	26	29	36	15

- \* Model 1 - Capitation for Part B services only, Part A paid on cost basis.  
 Model 2 - Capitation for Part B services + Part A services not exceeding \$5,000, remainder of Part A services paid on cost basis.  
 Model 3 - Capitation for Part B services + Part A services not exceeding \$10,000, remainder of Part A services paid on cost basis.  
 Model 4 - Capitation for Part B services + Part A services not exceeding \$15,000, remainder of Part A services paid on cost basis.  
 Model 5 - Capitation for Part B services + Part A services not exceeding \$20,000, remainder of Part A services paid on cost basis.

- \*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm 3\%$ , 50% responsible from  $\pm 3\%$  to  $\pm 20\%$ , and 0% responsible for costs  $> \pm 20\%$ ).



Table 2-1 (continued)

Summary Comparison Statistics, by Group Size, for Partial  
Capitation Models Using CMHS Data and Geographic Groups

	AAPCC	Partial Capitation Models *					Modified AAPCC**
		1	2	3	4	5	
<u>Product Moment Correlation</u>							
500	.70	.98	.95	.92	.88	.85	.94
1,000	.78	.98	.94	.91	.89	.87	.94
2,500	.92	.99	.98	.96	.95	.95	.97
5,000	.95	.99	.98	.98	.97	.97	.98
10,000	.88	.99	.97	.96	.94	.93	.95
20,000	.83	.99	.97	.94	.92	.91	.92
All Groups	.79	.98	.95	.93	.90	.88	.95
<u>R-squared</u>							
500	.48	.96	.90	.84	.77	.72	.87
1,000	.54	.95	.84	.75	.70	.67	.87
2,500	.81	.98	.90	.85	.83	.82	.93
5,000	.87	.98	.92	.89	.88	.88	.95
10,000	.72	.98	.88	.81	.73	.70	.88
20,000	.65	.98	.83	.73	.69	.66	.85
All Groups	.61	.97	.90	.84	.79	.76	.89
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>							
500	16%	13%	12%	12%	13%	13%	8%
1,000	12	11	12	12	12	12	7
2,500	11	9	13	13	12	12	7
5,000	9	9	12	11	11	10	6
10,000	8	7	9	9	9	8	5
20,000	7	5	9	9	8	8	5
All Groups	14	11	12	12	12	12	7
% Prospective Payment	100%	36%	60%	74%	82%	88%	98%

- 
- \* Model 1 - Capitation for Part B services only, Part A paid on cost basis.  
 Model 2 - Capitation for Part B services + Part A services not exceeding \$5,000, remainder of Part A services paid on cost basis.  
 Model 3 - Capitation for Part B services + Part A services not exceeding \$10,000, remainder of Part A services paid on cost basis.  
 Model 4 - Capitation for Part B services + Part A services not exceeding \$15,000, remainder of Part A services paid on cost basis.  
 Model 5 - Capitation for Part B services + Part A services not exceeding \$20,000, remainder of Part A services paid on cost basis.
- \*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm$  3%, 50% responsible from  $\pm$  3% to  $\pm$  20%, and 0% responsible for costs  $>$   $\pm$  20%).

regardless of size.

As can be seen in Table 2-1, the partial capitation model which only capitates Part B services (Model 1) produces estimates of actual costs for all groups with the lowest mean absolute value of error in predicted payments (\$10), while the current AAPCC methodology produces estimates with the highest mean absolute value of error in predicted payments (\$32). The modified AAPCC model with risk corridors produces predicted payments with a mean absolute value of error of \$19, while the partial capitation models with various levels of Part A services capitated produce predicted payments with a mean absolute value of error ranging from \$17 for Model 2 (Part A services not exceeding \$5,000 are capitated) to \$26 for Model 5 (Part A services not exceeding \$20,000 are capitated). This pattern of relative effectiveness also holds for each group size except for groups with 20,000 beneficiaries, where the current AAPCC methodology has a slightly lower mean absolute value of error than do Models 4 and 5. As expected, the mean absolute value of error is largest for the smallest group size for each model, while the largest group size has the smallest mean absolute value of error for each model.

The next measure shown in Table 2-1 is the mean absolute value of percent error in the predictive ratio. The partial capitation model with only Part B services capitated (Model 1) has the smallest mean error in the predictive ratio for each group size and for all groups, while the current AAPCC methodology has the largest mean error in the predictive ratio for all but one of the group sizes and for all groups. Once again, the largest group size has the smallest mean error in the predictive ratio and the smallest group size has the largest mean error in the predictive ratio.

The third measure shown in Table 2-1 is the percent of groups where the error in predicted payments is less than 5 percent of actual costs. Model 1 has the greatest percentage (78%) of groups with error less than 5 percent, while the current AAPCC model has the lowest percentage (34%) of groups with error less than 5 percent. The fourth measure shown in the table is the percent of groups where the error in predicted payments is greater than 10

percent of actual costs. Model 1 has the lowest percentage (2%) of groups with error greater than 10 percent and the current AAPCC model has the highest percentage (43%) of groups with error greater than 10 percent.

The next measure shown in Table 2-1 is the product moment correlation. For this measure, Model 1 has the highest correlation factor for each group size and for all groups, while the current AAPCC methodology has the lowest correlation factor for each group size and for all groups. It also appears that for each model, except Model 1, the correlation factor increases with group size up to groups with 5,000 beneficiaries and then begins to decrease with larger groups.

The sixth measure shown in the table is the R-squared statistic. For this measure, the R-squared statistic for Model 1 is consistently between 0.95 and 0.98. The current AAPCC methodology produces the lowest R-squared values, ranging from 0.48 to 0.87, while the values for the modified AAPCC model range from 0.85 to 0.95. For each model, except model 1, the R-squared statistic increases with group size from group sizes of 1,000 up to groups with 5,000 beneficiaries before falling for larger groups.

The final measure shown in Table 2-1 is the mean squared error as a percent of the mean prospective payment. The modified AAPCC model has the lowest mean squared error (7%), Model 1 has a mean squared error of 11%, and the current AAPCC model method has a mean squared error of 14%. The last line shown in Table 2-1 is the portion of health plan payments that is prospectively determined for each model tested. Payments to plans under the current AAPCC methodology are 100% prospective, while payments under the modified AAPCC model are 98% prospective. The partial capitation models, which involve some degree of cost reimbursement for Part A services, have prospective payments to plans ranging from 36% for Model 1 to 88% for Model 5.

In summary, the analysis using CMHS data and geographic groups indicated that the five partial capitation models tested all performed better than the current AAPCC methodology. In addition, the modified AAPCC model also performed better than the current AAPCC methodology. The modified AAPCC model

also consistently performed better than most of the five partial capitation models tested (Only Model 1 consistently performed better than the modified AAPCC model), despite the fact that the modified AAPCC model has a higher percentage of prospective payments to plans than did any of the five partial capitation models.

Tables 2-2, 2-3, and 2-4 summarize the same type of analysis shown in Table 2-1 using different combinations of data and type of group formation. Table 2-2 summarizes the analysis conducted with CMHS data and groups formed randomly. Table 2-3 summarizes the analysis conducted with HMO data and groups formed on a geographic basis. Finally, Table 2-4 summarizes the analysis conducted with HMO data and groups formed on a random basis. The results shown in these tables basically mirror those shown in Table 2-1 with respect to the relative effectiveness of each model tested. The current AAPCC method was consistently the worst model, while Model 1 and the modified AAPCC model were consistently the best models.

The four sets of analysis groups used in Tables 2-1 through 2-4 vary in a number of significant ways. First, due to the single HMO data set used, the HMO groups are limited in group size (there are no categories of size 10,000 or 20,000 persons in the HMO groups, either random or geographic-based). Second, the geographic-based groups from the CMHS data set are also limited for larger group sizes. There are 18 groups of size 10,000 and 11 groups of size 20,000 in the CMHS geographic-based data. Third, the degree of variation in actual costs varies greatly among the four sets of groups. For example,

Variance of Actual Costs

Group Size	CMHS Random	CMHS Geographic	HMO Random	HMO Geographic
500	1,301	4,528	1,157	1,362
1,000	675	3,496	658	616
2,500	281	6,565	190	518
5,000	120	6,454	131	149
10,000	63	2,107	na	na
20,000	31	1,639	na	na
All Groups	413	4,718	536	1,008

Table 2-2

Summary Comparison Statistics, by Group Size, for Partial  
Capitation Models Using CMHS Data and Random Groups

	AAPCC	Partial Capitation Models *					Modified AAPCC**
		1	2	3	4	5	
<u>Mean Absolute Value of Error in Predicted Payments</u>							
500 (N=185)	\$28	\$8	\$11	\$15	\$17	\$20	\$18
1,000 (N=56)	20	5	8	10	12	14	14
2,500 (N=52)	13	4	5	7	8	9	10
5,000 (N=20)	9	2	4	5	5	6	7
10,000 (N=18)	6	2	3	4	4	5	6
20,000 (N=11)	5	2	2	2	3	3	4
All Groups (N=342)	13	4	5	7	8	9	10
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>							
500	9%	2%	4%	5%	6%	6%	6%
1,000	7	2	3	3	4	5	5
2,500	4	1	2	2	3	3	3
5,000	3	1	1	2	2	2	2
10,000	2	1	1	1	1	2	2
20,000	2	0	1	1	1	1	1
All Groups	4	1	2	2	3	3	3
<u>Percent of Groups with Error Less than 5 Percent</u>							
500	35%	93%	72%	61%	53%	45%	44%
1,000	44	98	87	71	68	63	57
2,500	68	100	91	93	87	85	82
5,000	85	100	100	98	96	94	95
10,000	96	100	100	100	100	100	99
20,000	100	100	100	100	100	100	100
All Groups	71	98	93	87	84	81	79
<u>Percent of Groups with Error Greater than 10 Percent</u>							
500	42%	0%	3%	9%	16%	19%	10%
1,000	24	0	0	3	6	10	2
2,500	5	0	0	0	1	1	0
5,000	0	0	0	0	0	0	0
10,000	0	0	0	0	0	0	0
20,000	0	0	0	0	0	0	0
All Groups	12	0	0	2	4	5	2

\* Model 1 - Capitation for Part B services only, Part A paid on cost basis.  
 Model 2 - Capitation for Part B services + Part A services not exceeding \$5,000, remainder of Part A services paid on cost basis.  
 Model 3 - Capitation for Part B services + Part A services not exceeding \$10,000, remainder of Part A services paid on cost basis.  
 Model 4 - Capitation for Part B services + Part A services not exceeding \$15,000, remainder of Part A services paid on cost basis.  
 Model 5 - Capitation for Part B services + Part A services not exceeding \$20,000, remainder of Part A services paid on cost basis.

\*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm$  3%, 50% responsible from  $\pm$  3% to  $\pm$  20%, and 0% responsible for costs  $>$   $\pm$  20%).

Table 2-2 (continued)

Summary Comparison Statistics, by Group Size, for Partial  
Capitation Models Using CMHS Data and Random Groups

	AAPCC	Partial Capitation Models *					Modified AAPCC**
		1	2	3	4	5	
<u>Product Moment Correlation</u>							
500	.22	.98	.95	.90	.84	.78	.93
1,000	.20	.98	.95	.90	.85	.79	.92
2,500	.25	.97	.94	.89	.84	.79	.85
5,000	.24	.97	.93	.87	.80	.73	.70
10,000	.06	.97	.93	.86	.79	.71	.45
20,000	.22	.98	.94	.89	.83	.76	.33
All Groups	.21	.98	.95	.90	.84	.78	.89
<u>R-squared</u>							
500	.05	.93	.85	.74	.63	.53	.69
1,000	.04	.94	.85	.74	.63	.54	.61
2,500	.06	.93	.84	.74	.64	.56	.51
5,000	.04	.93	.83	.71	.59	.49	.36
10,000	.00***	.94	.83	.70	.57	.48	.17
20,000	.03	.94	.84	.71	.61	.52	.10
All Groups	.04	.93	.85	.74	.63	.53	.61
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>							
500	11%	9%	8%	8%	9%	9%	7%
1,000	8	6	5	6	6	7	5
2,500	5	4	4	4	4	4	4
5,000	4	3	2	3	3	3	3
10,000	3	2	2	2	2	2	2
20,000	2	1	1	1	1	1	2
All Groups	6	5	4	5	5	5	4
% Prospective Payment	100%	36%	60%	74%	82%	88%	98%

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- \* Model 1 - Capitation for Part B services only, Part A paid on cost basis.  
 Model 2 - Capitation for Part B services + Part A services not exceeding \$5,000, remainder of Part A services paid on cost basis.  
 Model 3 - Capitation for Part B services + Part A services not exceeding \$10,000, remainder of Part A services paid on cost basis.  
 Model 4 - Capitation for Part B services + Part A services not exceeding \$15,000, remainder of Part A services paid on cost basis.  
 Model 5 - Capitation for Part B services + Part A services not exceeding \$20,000, remainder of Part A services paid on cost basis.
- \*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm 3\%$ , 50% responsible from  $\pm 3\%$  to  $\pm 20\%$ , and 0% responsible for costs  $> \pm 20\%$ ).
- \*\*\* Indicates groups for which statistic was negative and correlation coefficient was substituted.

Table 2-3

Summary Comparison Statistics, by Group Size, for Partial  
Capitation Models Using HMO Data and Geographic Groups

	AAPCC	Partial Capitation Models *					Modified AAPCC**
		1	2	3	4	5	
<u>Mean Absolute Value of Error in Predicted Payments</u>							
500 (N=185)	\$32	\$16	\$19	\$23	\$26	\$28	\$19
1,000 (N=56)	27	13	16	18	19	20	18
2,500 (N=52)	22	12	14	16	18	19	15
5,000 (N=20)	16	9	11	12	14	14	11
10,000 (N=18)	na	na	na	na	na	na	na
20,000 (N=11)	na	na	na	na	na	na	na
All Groups (N=342)	28	14	17	20	22	24	17
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>							
500	10%	5%	6%	7%	8%	9%	6%
1,000	9	4	5	6	7	7	6
2,500	7	4	5	5	6	6	5
5,000	5	3	4	4	4	5	4
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	9	5	6	6	7	8	6
<u>Percent of Groups with Error Less than 5 Percent</u>							
500	24%	56%	44%	39%	32%	28%	38%
1,000	27	53	47	40	27	33	27
2,500	40	60	45	45	40	40	55
5,000	40	80	60	50	50	40	67
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	29	59	48	43	35	33	43
<u>Percent of Groups with Error Greater than 10 Percent</u>							
500	40%	10%	19%	32%	35%	43%	8%
1,000	40	7	7	13	13	20	0
2,500	20	0	5	5	10	15	5
5,000	10	0	0	0	0	10	0
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	33	7	13	22	24	32	6

\* Model 1 - Capitation for Part B services only, Part A paid on cost basis.

Model 2 - Capitation for Part B services + Part A services not exceeding \$5,000, remainder of Part A services paid on cost basis.

Model 3 - Capitation for Part B services + Part A services not exceeding \$10,000, remainder of Part A services paid on cost basis.

Model 4 - Capitation for Part B services + Part A services not exceeding \$15,000, remainder of Part A services paid on cost basis.

Model 5 - Capitation for Part B services + Part A services not exceeding \$20,000, remainder of Part A services paid on cost basis.

\*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm 3\%$ , 50% responsible from  $\pm 3\%$  to  $\pm 20\%$ , and 0% responsible for costs  $> \pm 20\%$ ).

Table 2-3 (continued)

Summary Comparison Statistics, by Group Size, for Partial  
Capitation Models Using HMO Data and Geographic Groups

	AAPCC	Partial Capitation Models*					Modified AAPCC**
		1	2	3	4	5	
<u>Product Moment Correlation</u>							
500	.18	.86	.78	.68	.58	.49	.85
1,000	.02	.82	.74	.63	.58	.54	.79
2,500	.19	.81	.71	.60	.50	.42	.66
5,000	.36	.73	.59	.48	.41	.38	.62
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	.16	.85	.76	.66	.55	.47	.80
<u>R-squared</u>							
500	.03***	.73	.60	.46	.31	.20	.66
1,000	.00***	.63	.48	.32	.23	.17	.41
2,500	.04***	.63	.47	.29	.10	.18***	.43
5,000	.13***	.16	.35***	.23***	.17***	.14***	.39***
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	.03***	.71	.57	.42	.28	.17	.62
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>							
500	13%	12%	11%	11%	11%	12%	7%
1,000	10	10	8	8	9	8	6
2,500	9	9	8	8	8	8	6
5,000	6	7	6	6	6	6	4
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	11	11	10	10	10	10	6
% Prospective Payment	100%	36%	60%	74%	82%	88%	98%

\* Model 1 - Capitation for Part B services only, Part A paid on cost basis.

Model 2 - Capitation for Part B services + Part A services not exceeding \$5,000, remainder of Part A services paid on cost basis.

Model 3 - Capitation for Part B services + Part A services not exceeding \$10,000, remainder of Part A services paid on cost basis.

Model 4 - Capitation for Part B services + Part A services not exceeding \$15,000, remainder of Part A services paid on cost basis.

Model 5 - Capitation for Part B services + Part A services not exceeding \$20,000, remainder of Part A services paid on cost basis.

\*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm 3\%$ , 50% responsible from  $\pm 3\%$  to  $\pm 20\%$ , and 0% responsible for costs  $> \pm 20\%$ ).

\*\*\* Indicates groups for which statistic was negative and correlation coefficient was substituted.



Table 2-4

Summary Comparison Statistics, by Group Size, for Partial  
Capitation Models Using HMO Data and Random Groups

	AAPCC	Partial Capitation Models *					Modified AAPCC**
		1	2	3	4	5	
<u>Mean Absolute Value of Error in Predicted Payments</u>							
500 (N=185)	\$27	\$10	\$13	\$16	\$18	\$20	\$17
1,000 (N=56)	19	7	10	12	14	15	14
2,500 (N=52)	11	4	6	7	8	8	9
5,000 (N=20)	9	4	5	6	6	7	8
10,000 (N=18)	na	na	na	na	na	na	na
20,000 (N=11)	na	na	na	na	na	na	na
All Groups (N=342)	16	6	8	10	11	12	12
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>							
500	9%	3%	5%	5%	6%	7%	6%
1,000	6	2	3	4	5	5	5
2,500	3	1	2	2	3	3	3
5,000	3	1	2	2	2	2	3
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	6	2	3	3	4	4	4
<u>Percent of Groups with Error Less than 5 Percent</u>							
500	36%	80%	67%	54%	52%	51%	44%
1,000	51	93	78	70	64	61	65
2,500	76	99	97	92	92	89	85
5,000	84	100	99	99	93	93	93
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	62	93	85	79	75	74	72
<u>Percent of Groups with Error Greater than 10 Percent</u>							
500	37%	5%	8%	14%	17%	19%	11%
1,000	20	0	4	5	10	11	5
2,500	1	0	0	0	0	0	0
5,000	0	0	0	0	0	0	0
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	15	1	3	5	7	8	4

- \* Model 1 - Capitation for Part B services only, Part A paid on cost basis.  
 Model 2 - Capitation for Part B services + Part A services not exceeding \$5,000, remainder of Part A services paid on cost basis.  
 Model 3 - Capitation for Part B services + Part A services not exceeding \$10,000, remainder of Part A services paid on cost basis.  
 Model 4 - Capitation for Part B services + Part A services not exceeding \$15,000, remainder of Part A services paid on cost basis.  
 Model 5 - Capitation for Part B services + Part A services not exceeding \$20,000, remainder of Part A services paid on cost basis.

- \*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm 3\%$ , 50% responsible from  $\pm 3\%$  to  $\pm 20\%$ , and 0% responsible for costs  $> \pm 20\%$ ).

Table 2-4 (continued)

Summary Comparison Statistics, by Group Size, for Partial  
Capitation Models Using HMO Data and Random Groups

	AAPCC	Partial Capitation Models *					Modified AAPCC**
		1	2	3	4	5	
<u>Product Moment Correlation</u>							
500	.32	.94	.89	.83	.77	.71	.93
1,000	.31	.95	.91	.86	.80	.74	.92
2,500	.24	.93	.88	.83	.78	.75	.82
5,000	.34	.95	.91	.85	.81	.77	.78
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	.31	.94	.90	.84	.78	.73	.91
<u>R-squared</u>							
500	.08	.85	.75	.64	.54	.46	.67
1,000	.07	.87	.76	.65	.55	.47	.62
2,500	.05	.84	.74	.64	.55	.49	.45
5,000	.06	.85	.75	.63	.54	.47	.37
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	.08	.85	.75	.64	.55	.47	.62
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>							
500	11%	9%	8%	8%	9%	9%	6%
1,000	8	6	6	6	6	7	5
2,500	4	4	3	3	3	4	3
5,000	4	3	3	3	3	3	3
10,000	na	na	na	na	na	na	na
20,000	na	na	na	na	na	na	na
All Groups	7	6	5	6	6	6	5
% Prospective Payment	100%	36%	60%	74%	82%	88%	98%

- \* Model 1 - Capitation for Part B services only, Part A paid on cost basis.  
 Model 2 - Capitation for Part B services + Part A services not exceeding \$5,000, remainder of Part A services paid on cost basis.  
 Model 3 - Capitation for Part B services + Part A services not exceeding \$10,000, remainder of Part A services paid on cost basis.  
 Model 4 - Capitation for Part B services + Part A services not exceeding \$15,000, remainder of Part A services paid on cost basis.  
 Model 5 - Capitation for Part B services + Part A services not exceeding \$20,000, remainder of Part A services paid on cost basis.

- \*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm 3\%$ , 50% responsible from  $\pm 3\%$  to  $\pm 20\%$ , and 0% responsible for costs  $> \pm 20\%$ ).

For the randomly selected groups, the variation in actual costs decreases with increasing group size, as would be expected because of the properties of random selection. The geographic-based groups maintain a larger variance across group sizes. The variance is smaller for the HMO geographic-based groups than the CMHS geographic-based groups primarily because the data come from a single HMO and there is less variance across five-digit zip code areas than across counties nationwide (the basis for the geographic-based groups from the CMHS data). We believe that the large variance in actual costs, as represented in the CMHS geographic-based groups, permits the best test of the accuracy of the alternative payment methods. Therefore, the remaining tables describe the results related to analysis conducted only with CMHS data and groups formed on a geographic basis.

Results for Low-cost and High-cost Groups

In an effort to evaluate the robustness of the results for the alternative payment methods tested, low-cost and high-cost groups were identified in the CMHS data according to the level of actual 1992 costs per member per month. Low-cost and high-cost groups were determined by comparing the actual cost PMPM for each group to the average cost PMPM for all groups in 1992. The values of the ratio of actual group cost PMPM to average cost PMPM for all groups used to identify low-cost and high-cost groups varied by group size, as indicated below:

Ratio of Group's Actual Cost PMPM to Average Cost PMPM for all Groups in 1992

<u>Group Size</u>	<u>Low-cost</u>	<u>High-cost</u>
500	0.90	1.10
1,000	0.93	1.07
2,500	0.95	1.05
5,000	0.97	1.03
10,000	0.98	1.02
20,000	0.99	1.01

Table 2-5 compares the effectiveness of the same models shown in Table 2-1, with the addition of considering the impact of low-cost versus high-cost groups within each group size. For this table, only two statistical measures are shown, the average predictive ratio and the mean absolute error.

The top part of Table 2-5 shows the average predictive ratio, where the predictive ratio for each group equals the estimated 1992 payments for that group (for a particular payment method) divided by actual 1992 costs for the group. The average predictive ratio is equal to the mean across all groups of a particular size. As shown in Table 2-5, for group size 500, the current AAPCC methodology overestimates the actual costs of low-cost groups by 11% and underestimates the actual costs of high-cost groups by 14%. This pattern is also observed for each of the other models tested, but the degree of bias is much smaller (usually within 5% of actual costs) than for the current AAPCC methodology. However, this pattern of bias does not follow for groups of 1,000 persons or more. In fact, for these larger groups, the AAPCC does a very good job of predicting actual costs for high-cost groups but is not as accurate as some of the partial capitation models when predicting actual costs for low-cost groups.

The bottom portion of Table 2-5 shows the mean absolute value of the error in predicted payments (in dollars) for each model. The mean absolute error for the high-cost groups is consistently higher than the mean absolute error for the low-cost groups. Once again, the current AAPCC methodology is generally the worst model, while Model 1 is consistently the best model.

#### Results for Models with Risk Corridors

Based on the results displayed in Tables 2-1 through 2-5, it appeared that most of the models with partial capitation and the modified AAPCC model with risk corridors performed consistently better than the current AAPCC methodology. Therefore, eight additional models were tested which combined partial capitation and risk corridors (these models were described earlier in section 2.2). Table 2-6 summarizes the results of the analysis using Models 6

Table 2-5

Summary Comparison Statistics for Partial Capitation Models  
for Low-cost and High-cost Groups, by Size of Group

	AAPCC	Partial Capitation Models *					Modified AAPCC**
		1	2	3	4	5	
<u>Average Predictive Ratio</u>							
500 - Low-cost	1.11	1.02	1.03	1.03	1.04	1.05	1.06
- High-cost	.86	.99	.58	.95	.93	.92	.94
- All groups	.99	1.00	1.00	.99	.99	.99	1.00
1,000 - Low-cost	1.10	1.02	1.03	1.05	1.06	1.07	1.06
- High-cost	.99	1.01	1.03	1.03	1.03	1.02	.99
- All groups	1.02	1.01	1.03	1.03	1.03	1.03	1.02
2,500 - Low-cost	1.09	1.02	1.02	1.03	1.04	1.05	1.05
- High-cost	1.02	1.01	1.05	1.06	1.06	1.05	1.01
- All groups	1.04	1.01	1.04	1.05	1.05	1.05	1.02
5,000 - Low-cost	.97	.98	.94	.93	.94	.94	.98
- High-cost	1.00	1.01	1.04	1.04	1.04	1.03	1.00
- All groups	.99	1.00	1.00	1.00	1.00	.99	.99
10,000 - Low-cost	1.02	1.00	.98	.98	.98	.99	1.02
- High-cost	.99	1.01	1.02	1.02	1.02	1.01	1.00
- All groups	1.01	1.00	1.00	1.00	1.00	1.00	1.01
20,000 - Low-cost	1.02	1.00	1.00	1.00	1.00	1.00	1.01
- High-cost	1.00	1.01	1.04	1.04	1.04	1.04	1.00
- All groups	1.01	1.01	1.02	1.03	1.03	1.02	1.01
<u>Mean Absolute Value of Error in Predicted Payments</u>							
500 - Low-cost	\$34	\$11	\$17	\$21	\$24	\$26	\$19
- High-cost	61	11	18	28	35	41	29
- All groups	38	11	17	22	26	29	21
1,000 - Low-cost	26	8	15	19	21	23	16
- High-cost	36	12	20	26	28	30	21
- All groups	28	9	16	20	22	24	17
2,500 - Low-cost	25	8	14	16	18	19	16
- High-cost	34	10	25	31	34	35	23
- All groups	28	9	18	23	25	26	19
5,000 - Low-cost	17	8	19	21	21	20	12
- High-cost	28	8	19	21	23	24	19
- All groups	22	8	19	21	22	22	15
10,000 - Low-cost	12	4	9	10	9	8	9
- High-cost	27	6	18	22	24	25	19
- All groups	18	5	13	15	16	16	13
20,000 - Low-cost	8	2	4	4	5	6	7
- High-cost	20	4	17	23	26	28	14
- All groups	17	4	12	16	18	19	12

\* For description of partial capitation models, see Table 2-1.

\*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm 3\%$ , 50% responsible from  $\pm 3\%$  to  $\pm 20\%$ , and 0% responsible for costs  $> \pm 20\%$ ).

Table 2-6

Summary Comparison Statistics, by Group Size, for Partial Capitation Models  
with Various Thresholds for Capitation of Part A Services Combined with Risk Corridors

	AAPCC	Partial Capitation Models*							Modified AAPCC**	
		6	7	8	9	10	11	12		13
<u>Mean Absolute Value of Error in Predicted Payments</u>										
500 (N=185)	\$38	\$ 9	\$11	\$14	\$15	\$8	\$11	\$12	\$14	\$21
1,000 (N=56)	28	8	11	12	13	7	9	10	11	17
2,500 (N=52)	28	9	12	13	13	9	11	12	13	19
5,000 (N=20)	22	10	11	11	11	9	10	11	11	15
10,000 (N=18)	18	6	8	8	8	6	8	8	8	13
20,000 (N=11)	17	6	8	9	10	6	8	9	10	12
All Groups (N=342)	32	9	11	13	14	8	10	12	12	19
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>										
500	13%	3%	4%	5%	5%	3%	4%	4%	5%	7%
1,000	9	3	3	4	4	2	3	3	3	5
2,500	9	3	3	4	4	3	3	4	4	6
5,000	7	3	4	4	4	3	3	4	4	5
10,000	6	2	2	2	2	2	2	2	2	4
20,000	5	2	2	3	3	2	2	3	3	4
All Groups	11	3	4	4	5	3	3	4	4	6
<u>Percent of Groups with Error Less than 5 Percent</u>										
500	24%	82%	69%	65%	56%	84%	70%	65%	56%	37%
1,000	43	82	84	82	75	84	84	82	75	54
2,500	44	79	69	65	64	79	69	65	64	54
5,000	35	90	75	70	70	90	75	70	70	45
10,000	61	94	94	94	89	94	94	94	89	78
20,000	64	100	91	91	82	100	91	91	82	73
All Groups	34	83	74	71	64	85	74	71	64	46

Table 2-6 (continued)

Summary Comparison Statistics, by Group Size, for Partial Capitation Models  
with Various Thresholds for Capitation of Part A Services Combined with Risk Corridors

	AAPCC	Partial Capitation Models*								Modified AAPCC**
		<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	
<u>Percent of Groups with Error Greater than 10 Percent</u>										
500	52%	3%	3%	10%	12%	0%	2%	5%	5%	20%
1,000	29	5	5	5	7	0	2	5	5	9
2,500	42	0	6	6	6	0	0	0	4	15
5,000	25	5	5	5	5	0	0	0	0	5
10,000	17	0	0	0	0	0	0	0	0	0
20,000	27	0	0	0	0	0	0	0	0	0
All Groups	43	3	4	7	9	0	1	4	4	15
<u>Product Moment Correlation</u>										
500	.70	.99	.98	.97	.96	.99	.98	.98	.97	.94
1,000	.78	.98	.97	.96	.95	.99	.98	.98	.97	.94
2,500	.92	.99	.99	.99	.98	.99	.99	.99	.99	.97
5,000	.95	1.00	.99	.99	.99	1.00	.99	.99	.99	.98
10,000	.88	.99	.99	.98	.98	.99	.99	.98	.98	.95
20,000	.83	.99	.98	.98	.97	.99	.98	.98	.97	.92
All Groups	.79	.99	.98	.97	.96	.99	.98	.98	.97	.95
<u>R-squared</u>										
500	.48	.97	.95	.93	.91	.98	.96	.95	.94	.87
1,000	.54	.95	.92	.90	.88	.97	.96	.95	.94	.87
2,500	.81	.97	.96	.96	.95	.98	.97	.96	.96	.93
5,000	.87	.98	.97	.97	.97	.98	.97	.97	.97	.95
10,000	.72	.97	.95	.94	.94	.97	.95	.94	.94	.88
20,000	.65	.96	.93	.92	.92	.96	.93	.92	.92	.85
All Groups	.61	.97	.95	.94	.93	.98	.96	.96	.95	.89

Table 2-6 (continued)

Summary Comparison Statistics, by Group Size, for Partial Capitation Models  
with Various Thresholds for Capitation of Part A Services Combined with Risk Corridors

	AAPCC	Partial Capitation Models*							Modified AAPCC**	
		6	7	8	9	10	11	12		13
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>										
500	16%	6%	7%	7%	8%	6%	6%	6%	6%	8%
1,000	12	7	7	7	7	5	5	5	5	7
2,500	11	7	7	6	6	6	6	6	6	7
5,000	9	6	6	6	5	6	6	5	5	6
10,000	8	4	4	4	4	4	4	4	4	5
20,000	7	4	4	4	4	4	4	4	4	5
All Groups	14	6	7	7	7	6	6	6	6	7
% Prospective Payment	100%	59.1%	72.4%	80.5%	85.8%	59.0%	72.2%	80.3%	85.5%	97.8%

\* Models 1 - 4 have a risk corridor equal to 20% of the cost for capitated services, with costs within the corridor split evenly and costs outside the corridor paid in full by the health plan. Models 5 - 8 also have a risk corridor equal to 20% of the cost for capitated services, with costs within the corridor split evenly. However, for these models, costs outside the corridor are paid in full by HCFA. The capitated services for each model are indicated below:

Models 1 and 5 - Capitation for Part B services + Part A services not exceeding \$5,000, remainder of Part A services paid on cost basis.  
 Models 3 and 6 - Capitation for Part B services + Part A services not exceeding \$10,000, remainder of Part A services paid on cost basis.  
 Models 4 and 7 - Capitation for Part B services + Part A services not exceeding \$15,000, remainder of Part A services paid on cost basis.  
 Models 5 and 8 - Capitation for Part B services + Part A services not exceeding \$20,000, remainder of Part A services paid on cost basis.

\*\* AAPCC with 3 risk corridors (plan 100% responsible for costs within  $\pm 3\%$ , 50% responsible from  $\pm 3\%$  to  $\pm 20\%$ , and 0% responsible for costs  $> \pm 20\%$ ).



- 13, in comparison to the current AAPCC methodology and the modified AAPCC model, based on CMHS data and groups formed on a geographic basis. The same seven statistical measures shown in Tables 2-1 through 2-4 are also shown in Table 2-6.

Models 6 through 9 are basically the same as Models 2 through 5, except that the partial capitation systems used in the previous models are combined with a risk corridor equal to  $\pm 20\%$  of the prospective payment rate for capitated services in each model. In each of the new models, any costs for capitated services which are between  $100\%$  and  $120\%$  of the prospective payment rate for such services are split evenly by the health plan and the government. Likewise, any savings which result from actual costs for capitated services being between  $80\%$  and  $100\%$  of the prospective payment rate are also split evenly by the health plan and the government. In addition, any costs for capitated services which exceed  $120\%$  of the prospective payment rate for such services are absorbed by the health plan, while any profits which result from costs below  $80\%$  of the prospective payment rate for capitated services are retained by the health plan.

Models 10 through 13 are identical to Models 6 through 9, except that beyond the risk corridor in which the health plan and HCFA share gains or losses at 50 percent each, the Government retains 100 percent of any profit and pays full plan costs which exceed the risk corridor.

As shown in Table 2-6, the addition of risk corridors to the partial capitation models previously tested helped to improve the effectiveness of each model. For example, the mean absolute value of error in predicted payments for Models 6 through 9 are \$9, \$11, \$13, and \$14, respectively. The values for the comparable models (Models 2 through 5) in Table 2-1 were \$17, \$21, \$24, and \$26, respectively. Therefore, the addition of risk corridors reduced the mean absolute value of error in predicted payments by nearly  $50\%$  for each model. This improvement was generally consistent across all of the measures shown in the tables. As a result, Models 6 through 9 appear to be nearly as accurate as Model 1, which was clearly the best model among the

first five models tested. However, Models 6 through 9 have a significantly higher proportion of prospective payments than did Model 1.

The results for Models 10 through 13 are slightly better than those for Models 6 through 9, although the improvements are small. This seems to indicate that there are very few groups whose actual costs for capitated services vary by more than 20% from the prospective payment for capitated services. As a result, the requirement that the government cover all costs outside the 20% risk corridor does not significantly affect the results compared to the requirement that the health plan cover all costs outside the risk corridor. One other observation to note is that although the modified AAPCC model performed better than some of the partial capitation models shown in Table 2-1, it does not perform as well as any of the models with risk corridors shown in Table 2-6.

The partial capitation models discussed above involved full capitation for Part B services and capitation for all Part A services below a particular cost threshold. Another possible type of partial capitation model would exclude certain Part A services from capitation (either fully or partially). Table 2-7 presents the results for partial capitation models with the following characteristics: (1) Part B services fully capitated, (2) capitation of Part A services excluding inpatient hospital services, (3) capitation of inpatient hospital services under a specified threshold, (4) cost reimbursement of inpatient hospital services exceeding the threshold, and (5) risk corridors of  $\pm 20$  percent. Models 1, 2, 3, and 4 in Table 2-7 represent capped risk corridors with thresholds for inpatient hospital services of \$5,000; \$10,000; \$15,000; and \$20,000; respectively. Models 5, 6, 7, and 8 represent uncapped risk corridors using the same thresholds. As shown in Table 2-7, there is little difference between the models with capped and uncapped risk corridors. These models also compare favorably with the other partial capitation models discussed above.

Table 2-7

Summary Comparison Statistics for Partial Capitation Models:  
CMHS Data, Geographic-based Groups  
 (50% Blended Rate for Short-Term Hospital)

Statistic (Group Size)	AAPCC	Partial Capitation Models*										Part B Part. Cap.
		No Risk Corridor					Capped Risk Corridor					
		1	2	3	4	5	6	7	8	9	10	
<u>Mean Absolute Value of Error in Predicted Payments</u>												
500 (N=185)	\$38	\$19	\$21	\$23	\$24	\$29	\$8	\$9	\$10	\$11	\$12	\$11
1,000 (N=56)	28	14	16	17	18	22	7	8	9	9	10	9
2,500 (N=52)	28	10	12	13	14	17	5	6	6	7	8	9
5,000 (N=20)	22	9	9	10	10	11	4	5	5	5	6	8
10,000 (N=18)	18	7	8	9	9	11	4	4	4	5	6	5
20,000 (N=11)	17	5	6	7	7	9	3	3	3	4	4	4
All groups (N=342)	32	15	17	19	20	23	7	8	8	9	10	10
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>												
500	13%	6%	7%	8%	8%	10%	3%	3%	3%	4%	4%	4%
1,000	9	4	5	5	6	7	2	2	3	3	3	3
2,500	9	3	4	4	4	5	2	2	2	2	3	3
5,000	7	3	3	3	3	4	1	1	1	2	2	3
10,000	6	2	3	3	3	4	1	1	1	1	2	3
20,000	5	2	2	2	2	3	1	1	1	1	1	1
All groups	11	5	6	6	6	8	2	3	3	3	3	3
<u>Percent of Groups with Error Less than 5 Percent</u>												
500	24%	50%	48%	45%	44%	35%	88%	80%	75%	72%	66%	71%
1,000	43	68	55	46	46	46	91	89	89	86	75	86
2,500	44	79	73	69	69	58	100	100	94	94	86	81
5,000	35	90	85	85	80	70	100	100	100	100	100	90
10,000	61	94	89	89	83	72	100	100	100	100	100	94
20,000	64	100	91	91	91	82	100	100	100	100	100	100
All groups	34	64	59	55	54	46	92	87	84	82	75	78

Table 2-7 (continued)

Summary Comparison Statistics for Partial Capitation Models:  
CMHS Data, Geographic-based Groups  
 (50% Blended Rate for Short-Term Hospital)

Statistic (Group Size)	AAPCC	Partial Capitation Models*										Part B Part. Cap.
		No Risk Corridor					Capite Risk Corridor					
		1	2	3	4	5	6	7	8	9	10	
<u>Percent of Groups with Error Greater than 10 Percent</u>												
500	52%	18%	25%	29%	31%	38%	0%	1%	2%	3%	3%	4%
1,000	29	9	11	11	14	25	0	0	0	0	0	0
2,500	42	0	0	6	6	14	0	0	0	0	0	0
5,000	25	0	0	0	0	0	0	0	0	0	0	0
10,000	17	0	0	0	0	0	0	0	0	0	0	0
20,000	27	0	0	0	0	0	0	0	0	0	0	0
All groups	43	11	15	18	20	27	0	1	1	1	2	2
<u>Product Moment Correlation</u>												
500	.70	.93	.91	.90	.88	.83	.99	.99	.98	.98	.98	.98
1,000	.78	.95	.94	.93	.92	.89	.99	.99	.98	.98	.98	.98
2,500	.92	.99	.98	.98	.98	.97	1.00	1.00	.99	.99	.99	.99
5,000	.95	.99	.99	.99	.99	.99	1.00	1.00	1.00	1.00	1.00	.99
10,000	.88	.98	.98	.98	.97	.96	1.00	1.00	.99	.99	.99	.99
20,000	.83	.99	.99	.98	.98	.97	1.00	1.00	1.00	.99	.99	.99
All groups	.79	.95	.94	.93	.92	.89	.99	.99	.99	.99	.98	.98
<u>R-squared</u>												
500	.48	.86	.83	.80	.77	.68	.98	.97	.97	.96	.96	.96
1,000	.54	.90	.88	.86	.84	.78	.98	.97	.97	.96	.95	.95
2,500	.81	.97	.97	.96	.96	.93	.99	.99	.99	.99	.98	.98
5,000	.87	.98	.98	.98	.98	.97	.99	.99	.99	.99	.99	.98
10,000	.72	.96	.96	.95	.95	.92	.99	.99	.99	.99	.98	.98
20,000	.65	.97	.97	.96	.95	.93	.99	.99	.99	.99	.98	.98
All groups	.61	.91	.89	.87	.85	.79	.98	.98	.97	.97	.97	.97

Table 2-7 (concluded)

Summary Comparison Statistics for Partial Capitation Models:  
CMHS Data, Geographic-based Groups  
 (50% Blended Rate for Short-Term Hospital)

Statistic (Group Size)	AAPCC	Partial Capitation Models*										Part B Part. Cap.
		No Risk Corridor					Capped Risk Corridor					
		1	2	3	4	5	6	7	8	9	10	
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>												
500	16%	14%	14%	15%	15%	17%	6%	6%	7%	7%	8%	13%
1,000	12	9	10	10	10	12	5	5	6	6	6	11
2,500	11	7	7	7	7	9	3	4	3	4	4	9
5,000	9	6	5	6	6	6	3	3	3	3	3	9
10,000	8	5	5	5	5	6	2	2	2	3	3	7
20,000	7	4	4	4	4	4	1	1	1	1	2	5
All groups	14	11	12	12	12	14	5	5	5	6	6	11
% Prospective payment	100%	59%	64%	67%	69%	74%	55%	60%	62%	64%	67%	36%

- \* Model 1 - Partial capitation with Part B capitated, Part A capitated excluding short-term hospital, and 50% of short-term hospital capitated under \$5,000 threshold (100% reinsurance above threshold), with no risk corridors.
- Model 2 - Same as Model 1, except \$10,000 threshold.
- Model 3 - Same as Model 1, except \$15,000 threshold.
- Model 4 - Same as Model 1, except \$20,000 threshold.
- Model 5 - Same as Model 1, except no threshold.
- Model 6 - partial capitation with Part B capitated, Part A capitated excluding short-term hospital, and 50% of short-term hospital capitated under \$5,000 threshold (100% reinsurance above threshold), with capped risk corridors (50% risk-sharing within  $\pm 20\%$ ).
- Model 7 - Same as Model 6, except \$10,000 threshold.
- Model 8 - Same as Model 6, except \$15,000 threshold.
- Model 9 - Same as Model 6, except \$20,000 threshold.
- Model 10 - Same as Model 6, except no threshold.

## 2.5 Additional Partial Capitation Models

In addition to the partial capitation models analyzed in this study, there are other partial capitation models which could be used to reimburse HMOs in the Medicare risk contracting program. The models discussed in this section are extensions of the models discussed earlier in this chapter. In particular, many of the features of partial capitation described throughout this chapter can be combined to provide more effective protection to health plans and advantages to the Government. There are an almost unlimited number of feasible combinations, which preserve all or most of the major advantages of the features incorporated.

For example, one extension of the basic risk corridor concept would be to set several corridors with various risk-sharing rates, e.g., risk shared 50% between 100% and 110% of the prospective payment rate, shared 25% between 110% and 120%, etc. This model would be similar to the modified AAPCC model shown in the tables above.

An example of a variation of the capped risk corridor model would be to set cumulative limits over several years as well as annual limits. For example, the total loss or profit PMPM could be restricted on a cumulative basis as follows:

Annual limit:	\$10
Two year limit:	\$18
Three year limit:	\$20

Another possible model would be one where the amount of risk assumed by a participating plan is phased-in over time. This concept can be illustrated by an example where the maximum possible gain or loss with a capped risk corridor model is phased-in over time.

The level of risk and the degree targeted can both be phased-in to reflect the narrower range of likely cost outcomes as a plan gains experience operating under a risk contract. There are two parameters that can be used to set the level and incidence of risk: the width of the corridor and the percentage of profits/losses assumed by the plan. These could be phased-in

over time as follows:

<u>Year</u>	<u>Width of Corridor</u>	<u>Percentage Assumed</u>	<u>Max Gain/Loss</u>
1-2	± 50%	10%	± 5%
3	± 35%	20%	± 7%
4	± 20%	50%	± 10%

Note that the total risk as a percentage of the income received would increase from 5 percent to 10 percent over four years, and that the incentive in the relevant range in which a successful plan must be operating to be willing to remain in the program grows from 10 percent to 50 percent.

The period to which the initial band applies is set at two years to reflect the time that could be required for a health plan to accumulate data from at least a full year of operation (which, if there are claims paid to providers or subcontractors, are not fully known for several months after the end of the year), analyze data to identify problem areas, and devise and implement corrective strategies.

An alternative to phasing in risk corridors over time would be to vary the corridor by the size of the health plan, thereby allowing smaller plans to have a wider corridor in which to share gains or losses with the government.

The remainder of this section provides some examples of additional partial capitation models. All of the models discussed involve the use of risk corridors.

#### Capped, Multiple Risk Corridors with \$25,000 Reinsurance

This combination would have the following features:

- ± 10 percent risk corridor with profits/losses shared evenly by the health plan and HCFA
- From ± 10 percent to ± 20 percent, profits/losses shared 25 percent by the health plan and 75 percent by the government
- Beyond ± 20 percent, full government responsibility.

There would also be reinsurance for all costs related to any individual above \$25,000 in a single year, with the health plan responsible for only 10

percent of the excess costs (and the government-financed reinsurance paying the other 90 percent). In addition, the total plan costs for any episode of hospital care would be limited to \$30,000. The government payment rate used to determine the gains or losses from the risk corridor would be reduced by the actuarial value of the reinsurance and the costs considered in determining the plan cost would exclude the reinsured expenses.

The combination of a capped risk corridor and reinsurance provides the advantages of both features, without any particular drawbacks other than to make the option somewhat more complicated to explain and administer.

Using multiple risk corridors permits targeting the amount of risk a health plan assumes to maximize the incentives in the most-likely range in which actual costs will be observed. By the same token, it limits the risk capital required to enter into a risk contract (or maximizes the enrollment a health plan with limited capital can insure on a risk basis). Use of multiple risk corridors, however, also increases the complexity of the risk design.

Varying the amount of reinsurance, either over time or by size of plan, may be preferable, but would make the option still more complex. In particular, it would be desirable to cap completely the responsibility of the health plan for inpatient hospital expenses at some point. In the interest of clear exposition, however, we present an option here based on simple reinsurance that pays 90 percent of the claims or other costs in excess of the threshold.

Capped, Multiple Risk Corridors with Initial Interval where Plan is Responsible for all Costs, Risk in Proportion to Likelihood and \$25,000 Reinsurance

This combination is similar to the previous option, but with the following multiple risk corridors.



<u>Corridor</u>	<u>Plan Share</u>	<u>Government Share</u>
< ± 5%	100%	0%
From ± 5% to ± 10%	75%	25%
From ± 10% to ± 15%	50%	50%
From ± 15% to ± 20%	25%	75%
From ± 20% to ± 25%	10%	90%
From ± 25% to ± 30%	5%	95%
≥ 30%	0%	100%

There would also be reinsurance on the same terms as the previous option, i.e., for all costs related to any individual above \$25,000 in a single year, with the health plan responsible for only 10 percent of the excess costs and the total plan costs for any episode of hospital care limited to \$30,000. The plan would not be responsible for costs more than 30 percent above the government payment rate, nor would it benefit from costs less than 70 percent of the government payment rate.

There are two major differences between this option and the previous option:

- The ± 5 percent corridor of full plan financial responsibility
- The tapering of the level of risk in proportion to the numbers of health plans that are likely to find their experience in the interval.

The latter distribution relates necessarily to all potential participating health plans. In practice, only those operating at a profit would be willing to remain in the program, and thus over time most of those with losses would drop out. Further, although the distribution of profit and loss corridors is symmetric, this does not necessarily reflect their probabilities over all potential health plans. The actual distribution is probably skewed to losses, since only health plans that do most things right are likely to provide care at rates significantly below the average cost of Medicare, and there are an almost unlimited number of ways to fail.

The primary advantage of this combination would be to offer a corridor of full plan responsibility and the financial incentives that this would generate in the range of cost outcomes in which most health plans will find their experience. Thus, most health plan managers will behave under the assumption

that any additional dollar spent will come from their bottom line. Further, as a result of the tapering and capping the maximum profit or loss, this level of financial incentive is provided without subjecting plans to the possibility of large losses, and without the possibility of very large profits.

The most obvious disadvantage is the opposite side of the same coin, i.e., whether 100 percent plan profit or loss is desirable in view of (i) the level of incentive to reduce care or manipulate the enrollment, and (ii) the probability of windfall profits from biased selection.

Capped, Multiple Risk Corridors Phased-in over time with Initial Interval where Plan is Responsible for all Costs, Risk in Proportion to Likelihood and \$25,000 Reinsurance

This combination is similar to the second option above, with the multiple risk corridors phased-in over time, as follows:

<u>Corridor</u>	<u>Plan Share in Years</u>		
	<u>1-2</u>	<u>3rd</u>	<u>4th</u>
< ± 5%	33%	67%	100%
From ± 5% to ± 10%	25%	50%	75%
From ± 10% to ± 15%	20%	33%	50%
From ± 15% to ± 20%	15%	20%	25%
From ± 20% to ± 25%	10%	10%	10%
From ± 25% to ± 30%	5%	5%	5%
≥ 30%	0%	0%	0%
Maximum Plan Risk	5.4%	9.3%	13.3%

There would also be reinsurance as in the previous options, i.e., for all costs related to any individual above \$25,000 in a single year, with the health plan responsible for only 10 percent of the excess costs and the total plan costs for any episode of hospital care limited to \$30,000. The plan would not be responsible for costs more than 30 percent above the government payment rate, or benefit from costs less than 70 percent of the government payment rate.

The primary advantage of phasing-in the risk corridors would be to reduce the risks and the windfall profits from favorable initial biased selection. There are no additional disadvantages compared to previous options.

In Chapter 6, selected partial capitation models analyzed in this chapter are compared to other alternative payment methods. Likewise, the advantages and disadvantages of partial capitation and risk corridor models are described and compared to alternative payment methods in Chapter 7.

## Chapter 3

### Experience Rating

This chapter discusses experience rating methods for setting payment rates for HMOs and other managed care organizations (MCOs) serving Medicare beneficiaries. Experience rating methods, which are based on the prior cost history of individual groups, are the primary methods used by private health insurers to set premium rates for medium-size and large commercial groups. The major advantage of experience rating is that it has been found to be the most accurate method of predicting future medical costs for defined population groups. In the next section, we present background information on experience rating as a method of setting payments for health plans. This is followed by a description of experience rating methods used by another federal government agency. Next, we present the results of analysis of alternative experience rating methods for Medicare beneficiaries.

#### 3.1 Background

Private insurance companies have used experience rating for decades as the primary method of determining premium rates for group health insurance policies for large employer groups. Many Blue Cross plans, which originally used community rating methods, switched to experience rating in the 1950s and 1960s, mainly in response to competitive pressures. Thus, the health insurance industry has many years of experience and much expertise in applying experience rating techniques for group health insurance products.

There are many forms of experience rating, and there are many different ways of implementing the basic experience rating concepts. For example, HMOs initially used community rating as their basic method for setting premium rates. During the past 6-8 years, however, most HMOs have adopted some form of experience rating as a premium rate-setting method. Approximately 52.3% of HMOs use "adjusted community rating," which is a form of prospective experience rating based on the differential health services utilization

experience of different groups.<sup>1</sup> Other HMOs use more sophisticated forms of experience rating comparable to that used by private health insurance companies. Thus, although experience rating is commonly referred to as a generic rating method, the experience rating systems employed by the major private insurers, Blue Cross plans, HMOs, and other MCOs differ significantly.

In addition, the U.S. Office of Personnel Management (OPM) permits two different forms of experience rating in the Federal Employees Health Benefits Program. The specific procedures used by OPM are described later in this chapter.

The two primary types of experience rating systems are "prospective experience rating" and "retrospective experience rating."<sup>2</sup> In prospective experience rating, the historical cost experience of a group is used as the basis of setting premium rates or capitation rates for a future year, and there are no adjustments to the rates based on the actual cost experience of the group during that year. The health plan is at risk for any differences between the premiums received and the actual cost experience of the group.

With retrospective experience rating, total payments to the health plan are determined retroactively after a group's cost experience is known, or can be estimated accurately, for the year in question. Experience rating methods operating on a retrospective basis take into account a group's actual experience in determining the total premiums that the health plan is due for providing health insurance to the particular group. For example, if a group's actual experience, in aggregate, is lower than the total amount of premiums paid during the year, then the group will be paid a refund or dividend or will receive a rate credit that will be used to reduce future premiums. In some cases, surpluses may go into a reserve (or rate stabilization) fund that

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<sup>1</sup> HMO Industry Profile: 1993 Edition, Washington, DC: Group Health Association of America, 1993.

<sup>2</sup> For additional details on experience rating, refer to C. W. Wrightson, HMO Rate Setting and Financial Strategy, Ann Arbor, MI: Health Administration Press, 1990.

is used to stabilize and smooth out year-to-year fluctuations in premium rates.

If retrospective methods are used and a group incurs a deficit (e.g., claims, administrative costs, and other expenses exceed the amount of premiums paid during the year), then an adjustment is made to recover the loss. If a reserve fund has been established, then the deficit is subtracted from the fund. Under some rating systems, the group is assessed the additional costs, usually up to a limit (expressed as a percentage of premium) agreed to and specified in the contract. In some cases, the deficits are carried forward, and future premiums are increased to recover the costs.

Thus, retrospective methods, like prospective experience rating methods, also use a group's historical experience to set premium rates. Retrospective methods, however, employ end-of-year settlements to determine the amount of surplus/deficit for each group, and cash payments or adjustments are made to reflect the group's actual cost experience.

Small groups are usually combined for experience rating purposes. They are often combined in classes reflecting such factors as age/gender composition of the group, industry, occupation, and geographic location of the group. Each of the groups in the class receives a premium that is guaranteed for the year. However, the actual experience of any particular group may never be recognized. This approach is referred to here as prospective experience rating by class.

Often combined with experience rating for small and medium-sized groups is a partial recognition of the individual group's own cost experience. This allows groups within a class to be given some credit for their own experience while limiting the effects of random fluctuations on the group's premium rate. The premium rate charged to any group in the class is a weighted average of the group's own costs and those of the whole class. The weight applied to the costs of an individual group is called a "credibility factor." For a very small group, the credibility factor would be close to zero; for a large group in the class, the credibility factor would be close to one. The premiums

charged under this approach are called blended rates. Other forms of blended rates are discussed in the next chapter.

As an example, a combination of prospective experience rating by class and blended rates could be used to reimburse HMOs in the Medicare risk program. The rating classes would be defined by the AAPCC categories: age, sex, Medicaid eligibility, and basis of eligibility (i.e., aged, disabled, ESRD). Institutional status would also be included if data were available for HMO enrollees. These classes would be recognized by comparing the HMO's cost in a base year to the plan's AAPCC based on these classifications. The plan's cost would be expressed as a percentage of the AAPCC.

The rate payable in the application year would then be a blend, or a weighted average, of the plan's adjusted cost (expressed as a percent of the AAPCC) and the AAPCC itself. The weight applied to the plan's cost experience is the credibility factor. This recognizes some of the plan's own experience. In effect, it suggests that the plan's cost is a useful indicator of the biased selection that may have resulted from the enrollment process. However, it does not give full credit to the experience. Thus, a plan with costs above the AAPCC has an incentive to reduce cost in the future. A plan that keeps its cost below the AAPCC gets a reward that will hopefully encourage it to enroll more Medicare beneficiaries. The penalties and rewards are not as large as under current procedures. Since most plans are believed to achieve favorable selection under the current methods, the result should be a savings to Medicare while some protection is afforded to plans that drew an unfavorable selection of risks.

In this formulation, the specification of the credibility factor determines the compromise between current practice and straight experience rating. A factor of zero gives current AAPCC methodology; a factor of one gives straight experience rating. Conceptually, the credibility factor should account for random variation, biased selection, and plan efficiency. Random variation is a function of plan size and the expense distribution of Medicare eligibles generally. Other things being equal, plans with larger enrollments

should have a higher credibility factor.

Another approach for dealing with variability in costs and high-cost cases is to use techniques such as reinsurance or pooling of claims. Reinsurance, as described in previous chapter, can be used to reduce the impact of high-cost cases. Variability in costs among groups can be reduced by pooling the costs of claims that exceed a specified threshold in the base year. These costs are then spread across all groups using a uniform pooling charge, e.g., an adjustment factor is applied to increase the base year rates (for claims under the threshold) according to the pooling charge (the percentage of claims that exceed the specified threshold). In this way, the impact is reduced on groups that may experience high costs in the base year.

In the following sections in this chapter, we operationalize many of the above concepts related to experience rating. A number of different experience rating methods for Medicare beneficiaries are formulated and analyzed.

### 3.2 Experience Rating Methods used in the Federal Employees Health Benefits Program

The U.S. Office of Personnel Management (OPM) administers the Federal Employees Health Benefits Program (FEHBP). Approximately 370 HMOs and 15 fee-for-service plans participate in FEHBP (eight of the fee-for-service plans have special eligibility requirements). The Office of Actuaries in OPM is responsible for review and approval of the premium rates that are charged by the participating health plans. There are two rate-setting methods that are used to determine the FEHBP premium rates: (1) experience rating, and (2) community rating. The purpose of this section is to explain how experience rating has been implemented by a government agency for a large, government-operated health program. Approximately 20 HMOs participating in FEHBP are experience-rated plans.

#### Experience Rating under FEHBP

Under the experience rating option, the medical costs and administrative expenses incurred by the plan form the basis for development of the premium



rates. Allowable administrative expenses include marketing costs, MIS expenses, salaries and fringe benefits of administrative staff, rent and facility expenses, utilization review and quality assurance costs, and other general and administrative expenses related to operating the health plan. Participating plans have to justify their level of administrative costs, and submit audited financial reports. OPM has placed an upper limit of seven percent on total administrative costs.

To determine projected medical expenditures under experience rating, the health plan is required to fill out a detailed questionnaire that documents the cost projections. A copy of the experience rating questionnaire is contained in Appendix C at the end of the report.

Experience rating for FEHBP plans is defined as "retrospective" experience rating. This means that the plan will be reimbursed, eventually, for all incurred medical costs. However, the specific procedures are complex and involve a number of reserve funds. In this chapter, we will present an overview of the experience rating calculations, and we will refer to the numbered sections of the "Experience-Rated Questionnaire for 1996 Rates" that is contained in Appendix C at the end of the report.

Section 2 of the questionnaire requires the health plan to reconcile the actual premium income that they have received with the estimated enrollment. The bottom part of section 2 is the calculation of the projected 1996 revenue based on the estimated 1996 enrollment and the requested 1996 premium rates (that are calculated later). The 1996 premium rates become effective January 1, 1996 for calendar year 1996.

Section 3 contains information on total claims paid, as of December 31, 1994 and as of April 30, 1995, for calendar years 1992, 1993, 1994 and 1995. Completion factors are calculated at the bottom of section 3. The completion factors represent the proportion of total estimated "incurred" claims for a specific year that have been paid as of a certain date.

Sections 4 to 8 focus on estimation of factors that will cause increases or decreases in incurred claims from 1993 to 1994, 1994 to 1995, and 1995 to

1996. The following projection factors are used: enrollment factor (section 4), benefits factor (section 5), trend factor (section 6), selection factor (section 7), and other factors (section 8).

Section 9 is a summary of incurred claims development for the years 1993 to 1996. Starting with total incurred claims in 1993, the five projection factors are applied to estimate the total incurred claims for the next year.

Section 10 estimates the Special Reserve as of December 31, 1994. The special reserve is the difference between the reserves from the accounting statement as of December 31, 1994 and the best estimate of the necessary accrued reserve (estimated incurred claims for 1992-94 minus paid claims for 1992-94). Section 11 provides additional detail on accrued reserves by year.

Section 12 requests information on administrative expenses. A separate accounting is required for administrative costs.

Section 13 contains calculations for the 1995 contingency payment, interest and investment income, and reserve calculations. The OPM Office of the Actuary sets the contingency reserve balance for each plan based on predetermined guidelines. The end of section 13 provides a summary of financial status for 1995.

Section 14 contains similar calculations for 1996. The projected financial status for 1996 is presented at the end of section 14. The contingency reserve is used if actual medical expenses exceed projected costs. It is funded by contributions at the rate of 3.85 percent of premiums that are deposited directly into the fund (subscribers pay approximately 104 percent of estimated premiums).

Experience-rated FEHBP plans are required to estimate total incurred claims and to determine premiums based on historical and projected claims experience. As described above, there are two types of reserves: (1) the contingency reserve, and (2) the special reserve. The contingency reserve is controlled by OPM. Funds are deposited monthly into an account at OPM under the health plan's name and designated for the contingency reserve.

The special reserve corresponds to a reserve for incurred-but-not-

reported (IBNR) claims. It is contained in the health plan's letter of credit account the Treasury that is used for drawing down funds to pay claims. If additional funds are required in the health plan's Treasury account, they are transferred from the contingency reserve to the Treasury account. Premiums are paid twice a month into the Treasury account. Based on the volume of paid claims, health plans draw down funds on a daily basis from the letter of credit Treasury account.

In terms of setting premium rates for the coming year (e.g., calendar year 1996), the general goal is to set premiums at a level so that total reserves (contingency and special) equal three and a half months of expenditures at the end of the year. The calculation of the premium rates takes into consideration the projected initial reserve levels (as of December 31, 1995), the desired final reserve levels (as of December 31, 1996), and the projected claims to be incurred during calendar year 1996. If the contingency reserve and special reserve have been overestimated in the past, then the health plan must lower premiums to account for the overpayments. If the estimated reserves are lower than desired, then the health plan must include that factor in the premium calculation so as to allow the reserves to build up during the next year. Plans that are experience rated must submit periodic accounting reports and audited financial statements to OPM so that OPM can monitor the financial status of the plan.

The 1996 premium rate document must be submitted to OPM by May 31, 1995. As discussed above, the 1996 premium rates are based on actual claims data for calendar year 1994 and earlier. Thus, there is a two-year lag between claims data and projected premium rates.

#### Adjusted Community Rating under FEHBP

The second form of experience rating under FEHBP is called "adjusted community rating." It is formally considered to be an option under community rating. However, it is basically a form of prospective experience rating. Premium rates are set prospectively, based on the expected utilization and

costs for FEHBP enrollees. Under this option, there are no retrospective adjustments based on the actual costs that are incurred during the year. Many of the participating HMOs use this rate-setting option.

FEHBP plans have two options under adjusted community rating. First, they can estimate the differences in utilization and intensity of services (e.g., hospital admissions, hospital days, office visits, etc.) used by Federal employees and their dependents, compared to the average utilization plan-wide. Premium rates are then determined by adjusting the standard community rates used by the health plan for the estimated differences of the FEHBP enrollees.

The second option under adjusted community rating permits health plans to use claims data to determine the cost experience of the FEHBP group and to use the historical cost experience as the basis for determination of the premium rates for the coming year. This option can be considered a form of prospective experience rating because premium rates are set prospectively based on the prior cost experience of the FEHBP enrollees.

Participating plans that elect to use adjusted community rating must document their procedures and describe their rate development process in detail. OPM reviews the requested rates and the documentation that is provided, and either approves the premium rates or requests revisions or additional information.

### 3.3 Results of Experience Rating Methods

The data and simulation model used in this chapter are the same as that used in Chapter 2 for the partial capitation methods. To simulate the effects of experience rating, there are additional data requirements. Under experience rating, HMO payment rates for a defined group of enrollees are a function of the historical cost experience of the group. We assume that an experience rating system would operate in a manner similar to that used by private insurers and by OPM for FEHBP. For example, rates for calendar year 1996 would be determined in the summer of 1995 using cost data from calendar

year 1994. Thus, there is a two-year lag between the historical cost data and the projected rates (for 1996). Because our HMO data covered the period 1990-1992, we also used CMHS data corresponding to the same time period. Therefore, for both data sets, the base year for the experience rates was 1990, and the projected year was assumed to be 1992. Estimated payments to HMOs were predicted for 1992 and compared to the actual 1992 cost data for the persons in each group.

The groups used in this analysis are "open groups." Group members are not required to be present in the data file for both 1990 and 1992. For example, a group might consist of 50 persons with only 1990 data, 425 persons with both 1990 and 1992 data, and 75 persons with only 1992 data. As a consequence, a group's estimated payments under experience rating will be determined using the data from one population (those in the group with 1990 data), and tested for accuracy and goodness-of-fit using the data from a slightly different population (those in the defined group with 1992 data). For comparison purposes, a payment method not related to prior expenses, such as the AAPCC, will use the same population (those in the group with 1992 data) for both determining estimated payments and testing for goodness-of-fit.

Persons who died in the period 1990-1992 are included in the open groups. We analyzed the impact of including and excluding deaths from the data base. If deaths are excluded, the accuracy of the experience rating models improves significantly. However, a large portion of the total costs are excluded if deaths are eliminated. Because it was desired to simulate the effects of alternative payment methods as realistically as possible, it was decided that deaths would not be excluded from the data base used to construct the groups.

An additional consideration for development of the groups was how to handle outliers. As compared to privately-insured persons under age 65, Medicare eligibles have a much higher frequency of high-cost cases. Several methods were considered for dealing with outliers (e.g., truncation at various thresholds and other modifications or transformations). However, it was

decided that actual costs for high-cost cases would not be modified or eliminated in the evaluation of alternative payment methods (e.g., the accuracy and reliability of each payment method must be evaluated according to its ability to handle the full distribution of Medicare costs by representative groups of enrollees). As explained later, the combination of open groups (including deaths) and the frequency of high-cost cases in Medicare presented substantial difficulties for many of the experience rating methods that were considered.

All of the statistical results for evaluation of the experience rating models were calculated on the groups structured from the four data sets, as described in Chapter 2: (1) groups formed by random selection of persons on the CMHS data file, (2) geographic-based groups from the CMHS, (3) geographic-based groups from the HMO data set, and (4) groups formed by random selection of persons from the HMO data set. For evaluation of experience rating methods, the HMO data is probably the most appropriate data source because it represents HMO practice patterns and cost experience which can be quite different from fee-for-service practice patterns and cost experience. However, the number of geographic-based groups available from the HMO data set is limited to 120 groups. As discussed in Chapter 2, the geographic-based groups using CMHS data have the greatest variance in actual costs and are probably the best test of the accuracy of the alternative payment methods. Statistical results are presented for all four sets of groups.

As discussed earlier in the chapter, there are many possible variations among experience rating systems. Most experience rating formulas, however, usually include the following components:

- Base year costs (medical claims, administrative expenses, other costs), with detail by type of service, etc.
- Adjustment factor for changes in covered medical services.
- Adjustment factor for changes in deductibles, coinsurance and other cost-sharing.
- Adjustment factor for changes in the provider network (e.g., adding a point-of-service option, etc.).
- Estimated inflation from the base year to the projected year.

- Estimated trend in utilization per eligible.
- Estimated demographic trend factor for changes in the size and demographic composition of the enrolled population.
- Estimated trend factor for any pooling of claims or reinsurance used as part of the experience rating system.
- Estimated trend factor for the residual impact of technology and other factors on medical costs.
- Estimated trend factor for administrative costs, including the impact of any changes in data reporting or other administrative requirements.
- Changes in the rate stabilization fund to account for surpluses or deficits in the base year or preceding years.
- Adjustment factor for changes in reserves for incurred but not reported, or unpaid, claims including the impact of changes in the size and per capita costs of the enrolled population.

A basic experience rating model (Model 1) was developed that was based on the 1990 costs for the persons in each group. The average 1990 per member per month cost for the group was determined by dividing aggregate actual costs by the number of months of Medicare eligibility for all 1990 group members. The 1990 experience rates were projected to 1992 by taking into account inflation, changes in the demographic mix of enrollees, and the number of months of eligibility for persons who were members of the group in 1992. It was assumed that there was no change in benefits or cost-sharing for 1992.

Model 2, the second experience rating model, was similar to Model 1, except that the costs of claims exceeding \$10,000 in the base year were pooled and distributed to all groups using a pooling charge, e.g., an adjustment factor was applied to increase the base year rates (for claims under the \$10,000 threshold) according to the pooling charge (the percentage of claims that exceeded the \$10,000 threshold). For Model 3, reinsurance was added to the basic features of Model 1. Claims that exceeded \$15,000 in 1992 were reimbursed at 70 percent (30 percent plan coinsurance) in exchange for a 15% reduction in the prospective capitation rate.

Models 1, 2 and 3 were evaluated for accuracy and goodness-of-fit between estimated payments and actual costs for 1992. As shown in Table 3-1 (CMHS data, geographic-based groups), none of the models performed very well.

Table 3-1

Summary Comparison Statistics for Experience Rating Models:  
CMHS Data, Geographic-based Groups

Statistic (Group Size)	AAPCC	Experience Rating Models*				Part B Partial Cap.
		1	2	3	4	
<u>Mean Absolute Value of Error in Predicted Payments</u>						
500 (N=185)	\$38	\$45	\$39	\$35	\$18	\$11
1,000 (N=56)	28	33	34	27	13	9
2,500 (N=52)	28	26	33	23	10	9
5,000 (N=20)	22	15	22	17	6	8
10,000 (N=18)	18	16	20	16	5	5
20,000 (N=11)	17	14	20	15	5	4
All groups (N=342)	32	36	35	29	14	10
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>						
500	13%	15%	13%	12%	6%	4%
1,000	9	10	11	9	4	3
2,500	9	8	10	7	3	3
5,000	7	5	7	5	2	3
10,000	6	5	7	5	2	2
20,000	5	4	6	4	2	1
All groups	11	12	12	10	5	3
<u>Percent of Groups with Error Less than 5 Percent</u>						
500	24%	23%	28%	28%	52%	71%
1,000	43	29	29	38	71	86
2,500	44	40	33	42	71	81
5,000	35	50	35	55	100	90
10,000	61	44	33	50	100	94
20,000	64	73	55	73	100	100
All groups	34	31	30	36	65	78
<u>Percent of Groups with Error Greater than 10 Percent</u>						
500	52%	54%	56%	45%	20%	4%
1,000	29	36	43	29	6	0
2,500	42	29	48	25	0	0
5,000	25	10	25	15	0	0
10,000	17	17	17	0	0	0
20,000	27	9	27	0	0	0
All groups	43	41	48	34	11	2

- \* Model 1 - Experience rating without additional adjustments.  
 Model 2 - Experience rating with pooling of base year claims above \$10,000.  
 Model 3 - Experience rating with reinsurance above \$10,000.  
 Model 4 - Experience rating with both pooling of base year (1990) claims above \$10,000 and reinsurance above \$10,000 for 1992 claims.



Table 3-1 (continued)

Summary Comparison Statistics for Experience Rating Models:  
CMHS Data, Geographic-Based Groups

Statistic (Group Size)	AAPCC	<u>Experience Rating Models*</u>				Part B Partial Cap.
		1	2	3	4	
<u>Product Moment Correlation</u>						
500	.70	.59	.68	.77	.94	.98
1,000	.78	.75	.69	.86	.96	.98
2,500	.92	.92	.89	.96	.99	.99
5,000	.95	.97	.97	.98	1.00	.99
10,000	.88	.91	.91	.95	.99	.99
20,000	.83	.91	.85	.94	.99	.99
All groups	.79	.74	.77	.86	.96	.98
<u>R-squared</u>						
500	.48	.24	.46	.54	.89	.96
1,000	.54	.45	.47	.65	.91	.95
2,500	.81	.84	.74	.86	.98	.98
5,000	.87	.94	.88	.93	.99	.98
10,000	.72	.81	.74	.83	.98	.98
20,000	.65	.81	.54	.82	.98	.98
All groups	.61	.49	.58	.68	.92	.97
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>						
500	16%	19%	16%	18%	12%	13%
1,000	12	14	13	13	8	11
2,500	11	10	13	11	6	9
5,000	9	6	9	8	3	9
10,000	8	6	8	7	3	7
20,000	7	5	8	6	3	5
All groups	14	16	14	15	9	11
% Prospective payment	100%	100%	100%	85%	65%	36%

- \* Model 1 - Experience rating without additional adjustments.  
 Model 2 - Experience rating with pooling of base year claims above \$10,000.  
 Model 3 - Experience rating with reinsurance above \$10,000.  
 Model 4 - Experience rating with both pooling of base year (1990) claims above \$10,000 and reinsurance above \$10,000 for 1992 claims.

In general, according to the statistics shown in Table 3-1, Models 1, 2 and 3 were equivalent in payment accuracy to the basic AAPCC payment methodology. From an analysis of the detailed group results, it appeared that the combination of open groups including deaths and the relatively high frequency of catastrophic cases among Medicare eligibles made it very difficult for the experience rating models (Models 1, 2 and 3) to accurately predict actual 1992 costs across representative groups.

A number of other possible experience rating models were formulated and tested. In particular, a blended rate model using a combination of the AAPCC and experience rates was examined. A credibility factor was used to combine the rates, as discussed above. For small groups of size 500, the credibility factor was .75 for the AAPCC and .25 for the rates based on experience rating. For groups of size 1,000, the credibility factor was .50 for both the AAPCC and experience rates. For groups of size 2,500, the credibility factor was .25 for the AAPCC and .75 for the experience rates. A credibility factor of .90 was applied to the experience rates for groups of size 5,000 (and a factor of .10 for the AAPCC rates). For groups of size 10,000 and 20,000, it was assumed that all of the credibility would be on the experience rates, and the AAPCC rates were given a credibility factor of zero.

Most of the resulting models using various modifications of experience rating, including the blended rate model, fared no better than Models 1, 2 and 3. However, one experience rating model was discovered that showed promising results.

Model 4 is based on experience rating with both pooling of claims above \$10,000 in the base year (1990) and the provision of reinsurance in the projected year (1992) for persons exceeding a \$10,000 threshold, along with the other features embodied in Model 1. As shown in Table 3-1, Model 4 performs substantially better than Models 1, 2 and 3 for all of the statistical measures. It is also significantly better than the standard AAPCC payment method.

For comparison purposes, the results for a partial capitation model

(capitation of Part B services, cost reimbursement for Part A services) are included in Table 3-1. As can be seen in Table 3-1, although Model 4 is better than Models 1, 2 and 3 and the AAPCC for all group sizes, it is worse than the Part B partial capitation model for the smaller group sizes (500, 1000 and 2500). However, Model 4 is better than the Part B partial capitation model for the larger group sizes (5000, 10,000 and 20,000).

With respect to the portion of the health plan payments that are prospectively determined, the AAPCC and Models 1 and 2 are 100 percent prospectively determined payment methods. Because Models 3 and 4 utilize reinsurance and the partial capitation method uses cost reimbursement for Part A services, these methods involve partly prospective and partly retrospective payments. The proportion of prospective payments for Models 3 and 4, and the Part B partial capitation method are 85 percent, 65 percent, and 36 percent, respectively.

Similar results are presented in Tables 3-2, 3-3 and 3-4 for CMHS data (random groups), HMO geographic groups, and HMO random groups, respectively. The only major difference in the results for Table 3-1 (CMHS geographic-based groups) versus the other tables is that Model 4 appears to perform as well as, if not better, than the model with Part B capitation and Part A cost reimbursement in the tables with HMO data (Tables 3-3 and 3-4). With the HMO cost data, Part B services account for approximately 50 percent of total costs, as compared to 36 percent for CMHS fee-for-service data.

Thus, Model 4 is a much more accurate experience rating payment method than Models 1, 2 or 3. However, one price to be paid for the increased accuracy is a reduction in the proportion of prospective payments. To determine if it is possible to extend the basic concept of Model 4 and increase the desired proportion of prospective payments, a number of additional models were investigated. The results of this investigation are reported in section 3.5.

Table 3-2

Summary Comparison Statistics for Experience Rating Models:  
CMHS Data, Randomly Selected Groups

Statistic (Group Size)	AAPCC	<u>Experience Rating Models*</u>				Part B Partial Cap.
		1	2	3	4	
<u>Mean Absolute Value of Error in Predicted Payments</u>						
500 (N=185)	\$28	\$35	\$31	\$27	\$15	\$8
1,000 (N=56)	20	26	22	19	10	5
2,500 (N=52)	13	18	14	14	7	4
5,000 (N=20)	9	12	10	10	5	2
10,000 (N=18)	6	8	7	7	3	2
20,000 (N=11)	5	6	5	5	3	1
All groups (N=342)	13	18	15	13	7	4
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>						
500	9%	11%	10%	9%	5%	3%
1,000	4	6	5	4	2	1
2,500	9	8	5	3	5	2
5,000	3	4	3	3	2	1
10,000	2	3	2	2	1	1
20,000	2	2	2	2	1	0
All groups	4	6	5	4	2	1
<u>Percent of Groups with Error Less than 5 Percent</u>						
500	35%	30%	29%	40%	55%	93%
1,000	44	36	40	49	77	98
2,500	68	52	63	65	93	100
5,000	85	66	77	81	99	100
10,000	96	89	94	95	100	100
20,000	100	96	99	99	100	100
All groups	71	61	67	71	87	98
<u>Percent of Groups with Error Greater than 10 Percent</u>						
500	42%	30%	42%	40%	11%	0%
1,000	24	34	29	23	1	0
2,500	5	18	10	6	0	0
5,000	0	5	1	0	0	0
10,000	0	2	0	0	0	0
20,000	0	0	0	0	0	0
All groups	12	18	14	11	2	0

- \* Model 1 - Experience rating without additional adjustments.  
 Model 2 - Experience rating with pooling of base year claims above \$10,000.  
 Model 3 - Experience rating with reinsurance above \$10,000.  
 Model 4 - Experience rating with both pooling of base year (1990) claims above \$10,000 and reinsurance above \$10,000 for 1992 claims.

Table 3-2 (continued)

Summary Comparison Statistics for Experience Rating Models:  
CMHS Data, Randomly Selected Groups

Statistic (Group Size)	AAPCC	Experience Rating Models*				Part B Partial Cap.
		1	2	3	4	
<u>Product Moment Correlation</u>						
500	.22	.23	.22	.55	.85	.98
1,000	.20	.20	.19	.55	.87	.98
2,500	.25	.08	.18	.46	.86	.97
5,000	.24	.02	.09	.39	.82	.97
10,000	.06	.16	.19	.50	.84	.97
20,000	.22	.06	.11	.40	.83	.98
All groups	.21	.19	.20	.53	.85	.98
<u>R-squared</u>						
500	.05	.06**	.05**	.10	.72	.93
1,000	.04	.04**	.04**	.13	.76	.94
2,500	.06	.01**	.03**	.21**	.74	.93
5,000	.04	.00**	.01**	.15**	.67	.93
10,000	.00**	.03**	.04**	.25**	.70	.94
20,000	.03	.00**	.01**	.16**	.68	.94
All groups	.04	.04**	.04**	.08	.73	.93
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>						
500	11%	14%	12%	13%	10%	9%
1,000	8	11	9	9	6	6
2,500	5	7	6	6	4	4
5,000	4	5	4	5	3	3
10,000	3	3	3	3	2	2
20,000	6	8	7	7	5	5
All groups	6	8	7	7	5	5
‡ Prospective payment	100%	100%	100%	85%	65%	36%

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 \* Model 1 - Experience rating without additional adjustments.  
 Model 2 - Experience rating with pooling of base year claims above \$10,000.  
 Model 3 - Experience rating with reinsurance above \$10,000.  
 Model 4 - Experience rating with both pooling of base year (1990) claims  
 above \$10,000 and reinsurance above \$10,000 for 1992 claims.

\*\* Indicates groups for which statistics was negative and correlation  
 coefficient was substituted.

Table 3-3

Summary Comparison Statistics for Experience Rating Models:  
HMO Data, Geographic-based Groups

Statistic (Group Size)	AAPCC	Experience Rating Models*				Part B Partial Cap.
		1	2	3	4	
<u>Mean Absolute Value of Error in Predicted Payments</u>						
500 (N=185)	\$32	\$39	\$30	\$32	\$14	\$16
1,000 (N=56)	27	38	23	31	11	13
2,500 (N=52)	22	23	20	17	9	12
5,000 (N=20)	15	11	10	8	4	9
10,000 (N=18)	na	na	na	na	na	na
20,000 (N=11)	na	na	na	na	na	na
All groups (N=342)	28	33	25	27	12	14
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>						
500	10%	13%	9%	10%	5%	5%
1,000	9	12	8	10	4	4
2,500	7	7	7	6	3	4
5,000	5	3	3	2	1	3
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	9	11	8	9	4	5
<u>Percent of Groups with Error Less than 5 Percent</u>						
500	24%	25%	29%	29%	69%	56%
1,000	27	27	40	27	73	53
2,500	40	40	40	60	85	60
5,000	44	67	89	100	100	79
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	29	33	39	42	76	59
<u>Percent of Groups with Error Greater than 10 Percent</u>						
500	40%	49%	33%	44%	10%	10%
1,000	40	53	40	53	0	7
2,500	20	25	25	15	0	0
5,000	11	0	0	0	0	0
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	33	40	29	36	6	7

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- \* Model 1 - Experience rating without additional adjustments.  
 Model 2 - Experience rating with pooling of base year claims above \$10,000.  
 Model 3 - Experience rating with reinsurance above \$10,000.  
 Model 4 - Experience rating with both pooling of base year (1990) claims  
 above \$10,000 and reinsurance above \$10,000 for 1992 claims.

Table 3-3 (continued)

Summary Comparison Statistics for Experience Rating Models:  
CMHS Data, Geographic-based Groups

<u>Statistic</u> <u>(Group Size)</u>	<u>AAPCC</u>	<u>Experience Rating Models*</u>				<u>Part B</u> <u>Partial Cap.</u>
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
<u>Product Moment Correlation</u>						
500	.18	.36	.40	.58	.88	.86
1,000	.02	.30	.48	.48	.87	.82
2,500	.19	.24	.28	.51	.90	.81
5,000	.41	.66	.57	.81	.91	.75
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	.16	.34	.40	.57	.88	.85
<u>R-squared</u>						
500	.03**	.13**	.16**	.34**	.76	.73
1,000	.00**	.09**	.23**	.23**	.70	.63
2,500	.04**	.06**	.08**	.26**	.80	.63
5,000	.17**	.44**	.25	.48	.83	.17
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	.03**	.12**	.16**	.32**	.76	.71
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>						
500	13%	16%	12%	15%	9%	12%
1,000	10	15	9	14	7	10
2,500	9	10	8	9	5	9
5,000	6	4	3	3	2	7
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	11	14	10	13	8	11
% Prospective payment	100%	100%	100%	85%	65%	36%

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 \* Model 1 - Experience rating without additional adjustments.  
 Model 2 - Experience rating with pooling of base year claims above \$10,000.  
 Model 3 - Experience rating with reinsurance above \$10,000.  
 Model 4 - Experience rating with both pooling of base year (1990) claims  
 above \$10,000 and reinsurance above \$10,000 for 1992 claims.

\*\* Indicates groups for which statistic was negative and correlation coefficient was substituted.

Table 3-4

Summary Comparison Statistics for Experience Rating Models:  
HMO Data, Randomly Selected Groups

Statistic (Group Size)	AAPCC	Experience Rating Models*				Part B Partial Cap.
		1	2	3	4	
<u>Mean Absolute Value of Error in Predicted Payments</u>						
500 (N=185)	\$27	\$35	\$30	\$26	\$14	\$10
1,000 (N=56)	19	22	19	16	19	7
2,500 (N=52)	11	14	12	11	5	4
5,000 (N=20)	9	11	9	9	5	4
10,000 (N=18)	na	na	na	na	na	na
20,000 (N=11)	na	na	na	na	na	na
All groups (N=342)	16	20	17	16	8	6
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>						
500	4%	12%	10%	9%	5%	3%
1,000	6	7	6	5	3	2
2,500	3	5	4	4	2	1
5,000	3	4	3	3	2	1
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	6	7	6	5	3	2
<u>Percent of Groups with Error Less than 5 Percent</u>						
500	36%	29%	34%	37%	64%	80%
1,000	51	41	50	56	83	93
2,500	76	66	70	71	96	99
5,000	84	72	83	80	100	100
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	62	52	59	61	86	93
<u>Percent of Groups with Error Greater than 10 Percent</u>						
500	37%	51%	40%	33%	9%	5%
1,000	20	26	23	16	1	0
2,500	1	9	5	3	0	0
5,000	0	3	3	0	0	0
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	15	22	18	13	3	1

\* Model 1 - Experience rating without additional adjustments.  
 Model 2 - Experience rating with pooling of base year claims above \$10,000.  
 Model 3 - Experience rating with reinsurance above \$10,000.  
 Model 4 - Experience rating with both pooling of base year (1990) claims above \$10,000 and reinsurance above \$10,000 for 1992 claims.



Table 3-4 (continued)

Summary Comparison Statistics for Experience Rating Models:  
HMO Data, Randomly Selected Groups

Statistic (Group Size)	AAPCC	<u>Experience Rating Models*</u>				Part B Partial Cap.
		1	2	3	4	
<u>Product Moment Correlation</u>						
500	.32	.17	.13	.50	.86	.94
1,000	.31	.39	.41	.68	.90	.95
2,500	.24	.25	.20	.55	.87	.93
5,000	.34	.35	.32	.62	.88	.95
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	.31	.25	.23	.57	.88	.94
<u>R-squared</u>						
500	.08	.03**	.02**	.25**	.73	.85
1,000	.07	.15**	.12	.33	.81	.86
2,500	.06	.06**	.04**	.31**	.75	.84
5,000	.06	.12**	.10**	.08	.77	.85
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	.07	.06**	.05**	.09	.76	.85
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>						
500	11%	14%	13%	13%	9%	9%
1,000	8	9	8	8	6	6
2,500	4	6	5	5	3	4
5,000	4	4	4	4	3	3
10,000	na	na	na	na	na	na
20,000	na	na	na	na	na	na
All groups	7	9	8	8	6	6
‡ Prospective payment	100%	100%	100%	85%	65%	36%

\* Model 1 - Experience rating without additional adjustments.  
 Model 2 - Experience rating with pooling of base year claims above \$10,000.  
 Model 3 - Experience rating with reinsurance above \$10,000.  
 Model 4 - Experience rating with both pooling of base year (1990) claims  
 above \$10,000 and reinsurance above \$10,000 for 1992 claims.

\*\* Indicates groups for which statistic was negative and correlation coefficient was substituted.

### 3.4 Results for Low-cost and High-cost Groups

To investigate the robustness of the results for the alternative payment methods, low-cost and high-cost groups were identified according to the level of actual 1992 costs on a per member per month basis. Table 3-5 shows the results for the low-cost and high-cost groups for each of the group size categories using the CMHS geographic-based groups.

The top part of Table 3-5 shows the average predictive ratio, where the predictive ratio for each group equals the estimated 1992 payments for that group (for a particular payment method) divided by actual 1992 costs. The average predictive ratio statistic is equal to the mean across all groups of a certain size.

As can be seen in Table 3-5, for group size 500, the AAPCC overpredicts the actual costs of low-cost groups by 11 percent. AAPCC payments underpredict the actual costs of high-cost groups by 14 percent. However, all of the payment methods overpredict the low-cost groups and underpredict the high-cost groups. As discussed in Chapter 2, small groups have high variance in actual costs. Some payment methods are relatively more accurate than others with respect to small groups, but all methods are biased high for small low-cost groups and biased low for small high-cost groups. For the payment methods shown in Table 3-5, the experience rating models 3 and 4 and the Part B capitation model have the smallest degree of bias for high-cost and low-cost groups.

For the larger groups, there is a less clear pattern of bias in estimated payments for the low-cost and high-cost groups. However, the overall trend is of overprediction of actual costs for the low-cost groups and underprediction of actual costs for the high-cost groups.

The bottom portion of Table 3-5 shows the mean absolute value of the error in predicted payments (in dollars). The mean error in predicted payments for the high-cost groups is consistently higher than the mean error for the low-cost groups.

Table 3-5

Summary Comparison Statistics for Experience Rating Models  
for Low-cost and High-cost Groups, by Size of Group

Statistic (Type of Group)	AAPCC	Experience Rating Models				Part B Partial Cap.
		1	2	3	4	
<u>Average Predictive Ratio</u>						
500 - Low-cost	1.11	1.09	1.15	1.03	1.04	1.02
- High-cost	.86	.85	.85	.91	.96	.99
- All groups	.99	.99	1.00	.98	1.00	1.00
1000 - Low-cost	1.10	1.11	1.13	1.07	1.05	1.02
- High-cost	.99	.98	.91	1.01	.99	1.00
- All groups	1.02	1.02	.99	1.03	1.01	1.01
2500 - Low-cost	1.09	1.05	1.10	1.01	1.03	1.02
- High-cost	1.02	1.00	.91	1.04	1.00	1.01
- All groups	1.04	1.02	.98	1.03	1.01	1.01
5000 - Low-cost	.97	1.00	1.08	.96	1.00	.98
- High-cost	1.00	1.01	.93	1.04	1.00	1.01
- All groups	.99	1.00	.99	1.00	1.00	1.00
10,000 - Low-cost	1.02	1.02	1.08	.99	1.01	1.00
- High-cost	.99	.99	.94	1.01	.99	1.01
- All groups	1.01	1.00	1.00	1.00	1.00	1.00
20,000 - Low-cost	1.02	1.05	1.04	1.03	1.02	1.00
- High-cost	1.00	.99	.92	1.03	.99	1.01
- All groups	1.01	1.01	.98	1.02	1.00	1.01
<u>Mean Absolute Value of Error in Predicted Payments</u>						
500 - Low-cost	\$34	\$36	\$38	\$28	\$16	\$11
- High-cost	61	70	59	50	21	11
- All groups	38	45	39	35	18	11
1000 - Low-cost	26	31	37	25	15	8
- High-cost	36	34	39	29	13	12
- All groups	28	33	34	27	13	9
2500 - Low-cost	25	21	27	17	10	8
- High-cost	34	25	38	25	7	10
- All groups	28	26	33	23	10	9
5000 - Low-cost	14	11	7	10	5	6
- High-cost	28	15	27	18	7	8
- All groups	22	15	22	17	6	8
10,000 - Low-cost	12	13	20	13	4	4
- High-cost	27	21	22	21	6	6
- All groups	18	16	20	16	5	5
20,000 - Low-cost	8	14	13	10	5	2
- High-cost	20	14	30	19	4	4
- All groups	17	14	20	15	5	4

### 3.5 Extension of Experience Rating Model 4

As discussed in the previous sections, many standard experience rating models did not perform well with the simulated groups of Medicare eligibles that corresponded to HMO enrollments. It appears that the medical expense characteristics of representative Medicare groups pose significant obstacles to payment models based on standard experience rating techniques. However, the combination of a number of reimbursement features including pooling of base year claims and reinsurance for actual claims appears to have resulted in a model (Model 4) that has relatively high accuracy in predicting actual costs for most size groups, and very high accuracy for groups with 5,000 or more eligibles.

The model that was tested had a relatively low threshold (\$10,000) for pooling of claims, and approximately 65 percent of the estimated payments were prospectively determined. To evaluate the impact of different thresholds on model accuracy and the proportion of prospectively determined payments, 9 other models similar to Model 4 were investigated. The models had thresholds for pooling of claims and reinsurance of \$5,000, \$10,000, \$15,000, \$20,000, \$25,000, \$30,000, \$35,000, \$40,000, \$45,000, and \$50,000. For the reinsurance portion of the models, we used a plan coinsurance rate of approximately 30 percent (the plan coinsurance percentage was adjusted so that the total estimated payments, across all groups, were equal for all 10 models). The results for the 10 models are shown in Table 3-6.

For the lowest threshold (\$5,000), approximately 45 percent of payments are prospective, and 55 percent of payments are retrospective. For all CMHS geographic-based groups combined, the mean absolute value of the error in predicted payments was only \$8 (approximately 3 percent of actual costs) for the first model shown in Table 3-6.

As the threshold increases, the percentage of prospective payments decreases so that, with a \$50,000 threshold, approximately 97 percent of total payments are prospective and only 3 percent are retrospective (the percentage of prospective payments is shown on the last line of Table 3-6 for each of the

Table 3-6

Experience Rating Models: The Impact of Different Thresholds for Pooling of Claims and Reinsurance Coverage

	Alternative Payment Methods*									
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
Threshold (in \$000's)	5	10	15	20	25	30	35	40	45	50
<u>Mean Absolute Value of Error in Predicted Payments</u>										
500 (N=185)	\$10	\$17	\$23	\$28	\$31	\$33	\$35	\$36	\$37	\$38
1,000 (N=56)	8	13	18	22	24	26	27	28	29	30
2,500 (N=52)	6	10	13	15	17	19	20	21	22	23
5,000 (N=20)	4	6	8	9	11	12	12	13	14	14
10,000 (N=18)	3	5	7	9	10	11	12	12	13	14
20,000 (N=11)	3	5	7	9	10	11	11	12	12	13
All Groups (N=342)	8	14	19	23	25	27	29	30	31	31
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>										
500	3%	6%	8%	10%	11%	11%	12%	12%	13%	13%
1,000	3	4	6	7	8	8	9	9	9	9
2,500	2	3	4	5	6	6	6	7	7	7
5,000	1	2	2	3	3	4	4	4	4	5
10,000	1	2	2	3	3	4	4	4	4	4
20,000	1	.	2	3	3	3	3	4	4	4
All Groups	3	5	6	8	8	9	10	10	10	10
<u>Percent of Groups with Error Less than 5 Percent</u>										
500	77%	52%	43%	34%	33%	32%	32%	32%	31%	30%
1,000	86	71	63	46	38	36	36	36	36	36
2,500	96	71	65	60	50	50	44	42	42	42
5,000	100	100	90	90	80	70	65	60	60	60
10,000	100	100	94	83	83	78	72	61	61	61
20,000	100	100	91	91	91	82	82	82	82	82
All Groups	85	65	56	48	43	41	40	39	38	38

Table 3-6 (continued)

Experience Rating Models: The Impact of Different Thresholds for  
Pooling of Claims and Reinsurance Coverage

	Alternative Payment Methods*									
	1	2	3	4	5	6	7	8	9	10
<u>Percent of Groups with Error Greater than 10 Percent</u>										
500	3%	19%	32%	38%	42%	45%	46%	49%	50%	51%
1,000	2	5	18	18	23	27	30	32	34	34
2,500	0	0	1	12	15	17	19	21	27	29
5,000	0	0	0	0	0	0	5	5	5	10
10,000	0	0	0	0	0	0	0	0	0	0
20,000	0	0	0	0	0	0	0	0	9	9
All Groups	2	11	22	25	29	32	34	35	38	39
<u>Product Moment Correlation</u>										
500	.98	.94	.90	.85	.81	.78	.75	.74	.72	.71
1,000	.99	.96	.92	.90	.86	.84	.82	.81	.79	.79
2,500	1.00	.99	.98	.97	.96	.96	.95	.95	.94	.94
5,000	1.00	.99	.99	.99	.99	.99	.98	.98	.98	.98
10,000	1.00	.99	.98	.97	.96	.96	.95	.94	.94	.93
20,000	1.00	.99	.99	.98	.99	.96	.95	.94	.94	.93
All Groups	.99	.96	.93	.90	.87	.85	.83	.82	.81	.80
<u>R-squared</u>										
500	.97	.89	.80	.72	.66	.61	.57	.54	.52	.50
1,000	.97	.92	.85	.79	.74	.70	.67	.65	.63	.62
2,500	.99	.98	.96	.94	.93	.92	.91	.90	.89	.88
5,000	1.00	.99	.99	.94	.98	.97	.97	.96	.96	.96
10,000	1.00	.98	.97	.84	.93	.91	.90	.89	.88	.87
20,000	1.00	.99	.97	.95	.93	.91	.90	.89	.88	.87
All Groups	.98	.93	.86	.81	.76	.72	.70	.67	.66	.64

Table 3-6 (continued)

Experience Rating Models: The Impact of Different Thresholds for  
Pooling of Claims and Reinsurance Coverage

	Alternative Payment Methods*									
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>										
500	9%	11%	13%	14%	15%	16%	16%	16%	17%	17%
1,000	7	8	10	10	11	12	12	12	12	13
2,500	5	6	7	7	8	18	8	9	9	9
5,000	3	3	4	4	5	15	5	5	5	6
10,000	2	3	4	4	5	5	4	5	6	6
20,000	2	3	3	4	4	4	4	5	5	5
All Groups	8	9	11	12	12	13	13	14	14	14
% Prospective Payment	46%	64%	76%	83%	88%	91%	93%	95%	96%	97%

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\* The alternative payment models are:

- Model 1 - Experience rating with \$5,000 threshold for pooling of claims and reinsurance.
- Model 2 - Experience rating with \$10,000 threshold for pooling of claims and reinsurance.
- Model 3 - Experience rating with \$15,000 threshold for pooling of claims and reinsurance.
- Model 4 - Experience rating with \$20,000 threshold for pooling of claims and reinsurance.
- Model 5 - Experience rating with \$25,000 threshold for pooling of claims and reinsurance.
- Model 6 - Experience rating with \$30,000 threshold for pooling of claims and reinsurance.
- Model 6 - Experience rating with \$35,000 threshold for pooling of claims and reinsurance.
- Model 7 - Experience rating with \$40,000 threshold for pooling of claims and reinsurance.
- Model 8 - Experience rating with \$45,000 threshold for pooling of claims and reinsurance.
- Model 9 - Experience rating with \$50,000 threshold for pooling of claims and reinsurance.
- Model 10 - Experience rating with \$50,000 threshold for pooling of claims and reinsurance.

payment methods). However, compared to the \$5,000 threshold, the error in predicted payments increases from \$8 to \$31, and the percentage error increases from 3 percent to 10 percent.

In summary, experience rating methods offer various advantages because they are based on the historical cost experience of the group of Medicare eligibles that are enrolled in the HMO. Thus, experience rating can be viewed as a form of risk adjustment system. Although the characteristics of the Medicare population related to medical costs pose a number of problems for development of a realistic and accurate payment model using experience rating, any type of risk adjustment system for Medicare enrollees faces the same types of problems. A selected number of experience rating models are compared to alternative payment methods in Chapter 6.



## Chapter 4

### Select and Ultimate Rates

In this chapter we explore the possibility of using regression to the mean in health care spending to expand the AAPCC classification to include duration since some salient event such as a hospitalization. The concept is commonly used by life and health insurers either by using explicit tables or by restricting coverage during a waiting period. The evidence developed here suggests that accounting for duration since a significant medical event provides some improvement over the present method of risk classification. Little advantage is gained by the more complex methods explored here if enrollment is strictly randomized. The greatest advantages occur where biased selection is a result of the individual's or plan's consideration of medical history as enrollment criteria.

#### 4.1 Background

Select and ultimate mortality rates are commonly used by life insurers to reflect the lower mortality that typically follows in the years after an enrollee has been accepted for life insurance coverage. The mortality is lower for them than for persons of the same age and sex who have not been recently "underwritten" because the selection process rejects those who have conditions that impair health. The relative improvement in mortality gradually wears off with duration since selection until the select group is indistinguishable from the general population after several years. Although the selection probably influences mortality for many years, insurers often maintain separate tables for only a few years for simplicity.

The degree to which select mortality differs from aggregate mortality varies with the rigor of the insurer's underwriting process. However it is not practical for most insurers to create their own select and ultimate tables from scratch because of the huge volume of claims that would be required to obtain reliable results at the level of detail required by a select and

ultimate goal. Instead, most companies use the experience collected in intercompany studies and modify the rates with simple transformations to reflect their own practices.

#### 4.2 Results of Analysis of Select and Ultimate Rates

A similar phenomenon which has been identified in health care spending is referred to as "regression to the mean." Closed groups of high-cost or low-cost individuals tend to move rapidly to expenses closer to the mean over a short period. We illustrate this with several tabulations from the Continuous Medicare History Sample (CMHS) data file. Table 4-1 shows the progression to the mean for a closed cohort of enrollees from the CMHS 5% sample of the state of Minnesota. Enrollees with any HMO involvement in the observation period have been excluded because their records in the CMHS are incomplete. The file was sorted by Medicare reimbursement level in 1987 into a cohort with no claims in 1987 and quintiles of those with claims. Each individual's expenditures have been normalized by dividing them by an age-sex-Medicaid status index created from enrollees in the state in 1987. Table 4-2 is a similar tabulation for the state of Washington.

The cohorts selected in 1987 were followed through 1992. The mean expense of the closed cohorts are compared to the statewide means for all enrollees in the state, allowing for new entrants. The overall mean expense for the closed group rises moderately over the period because the closed group is aging.

Both tables show a rapid movement towards the mean in the first year following the "selection" into quintiles, but a strong persistence of the selection through the fifth succeeding year. The ratio of expenses in the current year to the prior year rapidly move towards 1.00 by the third year. The patterns of regression to the mean are quite similar in the two states.

Tables 4-3 and 4-4 show the results of randomly selected groups of enrollees from Washington state, intended to represent enrollment in group health plans. In Table 4-3, approximately 200 enrollees have been assigned

Table 4-1

## Average expense/enrollee month by 1987 expense cohort

Minnesota State							
quintile in 1987	1987	1988	1989	1990	1991	1992	1993
zero claims	0	78	126	178	186	184	225
first	3	101	162	175	213	221	261
second	11	151	192	250	233	267	247
third	34	196	244	334	325	313	356
fourth	164	267	333	390	355	377	355
fifth	1054	472	436	499	486	467	511
all	170	184	223	275	271	275	297
average expense/capita by all residents							
	168	179	213	255	248	245	261
Ratio of cohort per capita cost to statewide mean							
zero claims	0.00	0.44	0.59	0.70	0.75	0.75	0.86
first	0.02	0.56	0.76	0.68	0.86	0.90	1.00
second	0.07	0.84	0.90	0.98	0.94	1.09	0.95
third	0.20	1.10	1.15	1.31	1.31	1.28	1.37
fourth	0.98	1.49	1.56	1.53	1.43	1.54	1.96
fifth	6.29	2.64	2.05	1.96	1.96	1.90	1.96
all	1.01	1.03	1.05	1.08	1.09	1.12	1.14
ratio to prior year							
zero claims		n/a	1.35	1.18	1.08	1.00	1.15
first		32.85	1.35	0.90	1.25	1.05	1.11
second		12.68	1.07	1.09	0.96	1.16	0.87
third		5.44	1.05	1.14	1.00	0.98	1.07
fourth		1.52	1.05	0.98	0.93	1.08	0.89
fifth		0.42	0.78	0.96	1.00	0.97	1.03
all		1.01	1.02	1.03	1.01	1.03	1.02

Table 4-2

## Average expense/enrollee month by 1987 expense cohort

Washington State							
quintile in 1987	1987	1988	1989	1990	1991	1992	1993
zero claim	0	78	114	158	245	218	239
first	5	123	168	208	286	244	266
second	17	157	192	228	332	285	290
third	42	216	240	310	416	312	354
fourth	200	316	327	363	526	417	417
fifth	1152	521	494	520	716	581	544
all	179	200	222	263	372	304	317

## average expense/capita by all residents

179	198	215	252	348	277	285
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## Ratio of cohort per capita cost to statewide mean

zero claim	0.00	0.40	0.53	0.62	0.70	0.78	0.84
first	0.03	0.62	0.78	0.82	0.82	0.88	0.93
second	0.09	0.80	0.89	0.90	0.95	1.03	1.02
third	0.24	1.09	1.12	1.23	1.20	1.12	1.24
fourth	1.12	1.60	1.52	1.44	1.51	1.50	1.46
fifth	6.43	2.64	2.30	2.06	2.06	2.09	1.91
all	1.00	1.01	1.03	1.04	1.07	1.10	1.11

## ratio to prior year

zero claims	n/a	1.34	1.18	1.13	1.11	1.07
first	23.78	1.25	1.06	1.00	1.07	1.06
second	8.52	1.12	1.01	1.06	1.08	0.99
third	4.63	1.02	1.10	0.97	0.94	1.11
fourth	1.44	0.95	0.95	1.05	0.99	0.97
fifth	0.41	0.87	0.90	1.00	1.02	0.91
all	1.01	1.02	1.01	1.03	1.02	1.02





completely randomly to each of 100 groups. In Table 4-4, enrollees with expenses below the top quintile in 1987 have been assigned randomly and enrollees with expenses in the top quintile have been assigned so as to bias costs to increase with increasing plan number, using a square root function so that plans 1-33 received one-ninth of the top quintile while plans 67-100 received five ninths of the top quintile. Here, the deviation from the mean drops rapidly in the first two years and approaches 1.00 by the fifth year.

In Table 4-5, the plans from Table 4-3 have been placed in five groups by expense levels in 1987. Similarly, Table 4-6 summarizes the results for plans in Table 4-4. Where enrollees have been distributed randomly (Table 4-5), the expense range among the five quintiles is narrower than where expenses were deliberately biased (Table 4-6). Moreover, where the distribution of expenses among plans results from random variation, there is virtually no persistence of bias into future years. On the other hand, when the plan enrollment has been deliberately biased by selection, the bias continues for some years into the future. This theme of deliberate vs. random bias will recur throughout this chapter.

Tables 4-7 and 4-8 illustrate how minimal users tend to continue to be minimal users over time. The low average cost of persons who have had low costs in prior years results in large part from individuals with no reimbursable expense in the current year. Tables 4-E1 through 4-E5, and Tables 4-EU1 through 4-EU3 in the Appendix at the end of this chapter provide more detail on individuals with a history of low medical care use.

#### 4.3 Potential Applications of Select and Ultimate Rates

One possible way to use the principle of regression to the mean as part of a formula for reimbursing Medicare risk HMOs is to provide separate AAPCC factors for individuals who have been "selected" by a salient event. Several examples are presented in this section.

The current procedure for preparing payment rates starts with a tabulation of national per capita costs by age, sex, Medicaid eligibility,

Table 4-5

## Enrollee Groups Drawn Randomly from Washington State FFS Enrollees

## Closed Cohorts, Cost Normalized to 1.00

Plan Quintile	1987	1988	1989	1990	1991	1992	1993
1	0.77	0.97	0.98	0.98	1.00	1.06	0.98
2	0.90	0.97	0.94	1.01	1.01	0.99	1.04
3	0.98	1.05	1.03	1.00	1.00	1.01	1.01
4	1.09	0.97	1.04	1.03	0.99	0.96	1.01
5	1.26	1.03	1.01	0.99	1.00	0.98	0.96
Mean	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Std Dev	0.17	0.04	0.04	0.01	0.01	0.03	0.03



Table 4-6

**Enrollee Groups Drawn Randomly from Washington State FFS Enrollees  
Biased Selection of Top Quintile in 1987**

**Closed Cohorts, Cost Normalized to 1.00**

<b>Plan Quintile</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
1	0.41	0.82	0.84	0.92	0.96	0.94	0.89
2	0.73	0.90	0.91	0.94	0.96	0.93	1.06
3	1.00	0.98	1.06	0.96	1.01	0.98	0.99
4	1.32	1.11	1.11	1.08	1.01	1.05	1.05
5	1.54	1.20	1.08	1.11	1.06	1.11	1.01
Mean	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Std Dev	0.40	0.14	0.10	0.08	0.04	0.07	0.06

Table 4-7

**Medicare Continuous History Sample, 1993 Expenditures for Closed Population  
(Excludes HMO Enrollees, Status 31 ESRD, Part A only and Part B only)**

Decile	lower bound	upper bound	All Persons				Reimbursement <1,000, A or B in last 3 years				Reimbursement = \$0 in last 3 years (1)			
			Persons (000)	Total \$	\$/ case	% distrib	Persons (000)	Total \$	\$/ case	% distrib	Persons (000)	Total \$	\$/ case	% distrib
0	\$0	\$0	36.3	0	0	13.7%	29.1	0.0	0	25.4%	15.3	0.0	0	70.0%
0+	\$0	\$1	0.1	0	1	0.0%	0.1	0.1	1	0.1%	0.0	0.0	1	0.1%
1	\$1	\$64	20.1	556	28	7.6%	13.5	361.9	27	11.8%	1.8	38.8	22	8.1%
2	\$64	\$158	21.5	2368	110	8.1%	13.0	1419.5	109	11.4%	0.9	99.6	107	4.3%
3	\$158	\$278	22.1	4764	216	8.3%	11.9	2545.9	214	10.4%	0.6	127.5	212	2.8%
4	\$278	\$453	22.6	8147	360	8.5%	10.4	3712.5	357	9.1%	0.5	163.7	357	2.1%
5	\$453	\$735	23.1	13443	582	8.7%	8.6	4978.2	576	7.5%	0.4	221.0	572	1.8%
6	\$735	\$1,280	23.5	22789	972	8.8%	6.8	6514.7	959	5.9%	0.3	321.5	974	1.5%
7	\$1,280	\$2,578	23.5	43179	1,836	8.9%	5.8	10650.9	1,845	5.0%	0.4	766.4	1,856	1.9%
8	\$2,578	\$5,490	23.9	92526	3,872	9.0%	5.9	22802.0	3,868	5.1%	0.5	2084.0	4,015	2.4%
9	\$5,490	\$13,222	24.2	209927	8,665	9.1%	5.2	44643.3	8,582	4.5%	0.6	4765.0	8,617	2.5%
10	\$13,222	\$424,868	24.4	691539	28,391	9.2%	4.3	115438.6	26,778	3.8%	0.6	16265.1	28,941	2.6%
			265.3	1089239	4,105	100.0%	114.7	213071.6	1,858	100.0%	21.8	24852.6	1,140	100.0%

(1) Deciles defined by all 1993 enrollees

(2) Person counts include a full year for each 1993 enrollee so exposure is overstated

Table 4-8

**Medicare Continuous History Sample, 1993 Expenditures for Open Population  
(Excludes HMO Enrollees, Status 31 ESRD, Part A only and Part B only)**

Decile	lower bound	upper bound	All Persons				Reimbursement <1,000, A or B in last 3 years				Reimbursement = \$0 in last 3 years (1)			
			Persons (000)	Total \$	\$/ case	% distrib	Persons (000)	Total \$	\$/ case	% distrib	Persons (000)	Total \$	\$/ case	% distrib
0	\$0	\$0	53.4	0	0	16.4%	45.8	0.0	0	27.5%	30.0	0.0	0	53.1%
0+	\$0	\$1	0.1	0	1	0.0%	0.1	0.1	1	0.1%	0.0	0.0	1	0.1%
1	\$1	\$64	27.0	738	27	8.3%	20.0	530.8	26	12.0%	6.4	153.4	24	11.4%
2	\$64	\$158	27.2	2982	110	8.3%	18.2	1980.6	109	10.9%	4.0	430.4	107	7.1%
3	\$158	\$278	27.2	5854	215	8.3%	16.4	3505.3	214	9.8%	3.0	632.8	213	5.3%
4	\$278	\$453	27.3	9832	360	8.4%	14.4	5154.1	358	8.7%	2.4	868.9	359	4.3%
5	\$453	\$735	27.4	15936	581	8.4%	12.1	6980.1	577	7.3%	2.1	1183.1	576	3.6%
6	\$735	\$1,280	27.5	26681	972	8.4%	9.8	9430.8	962	5.9%	1.8	1712.4	970	3.1%
7	\$1,280	\$2,578	27.3	50045	1,833	8.4%	8.5	15509.9	1,835	5.1%	1.8	3319.6	1,827	3.2%
8	\$2,578	\$5,490	27.3	105432	3,868	8.4%	8.2	31768.1	3,855	5.0%	1.8	7127.5	3,884	3.3%
9	\$5,490	\$13,222	27.3	236200	8,661	8.4%	7.1	60790.6	8,581	4.3%	1.7	14420.5	8,625	3.0%
10	\$13,222	\$424,868	27.2	776874	28,530	8.3%	5.8	157743.6	27,053	3.5%	1.5	41949.0	28,229	2.6%
			326.2	1230574	3,773	100.0%	166.4	293403.0	1,763	100.0%	56.4	71797.6	1,272	100.0%

(1) Includes new entrants in past 3 years if no payments made on their behalf

(2) Person counts include a full year for each 1993 enrollee so exposure is overstated

disability status and institutional status. Within the CMHS, it is not possible to distinguish institutional status, but we have constructed a comparable set of factors based on the 1993 file as shown in Table 4-A1 (all of the following tables are contained in the Appendix at the end of this chapter). These values have not been graduated to produce the smooth progressions of the AAPCC factors. Graduation would be desirable if the tables would be used for plan reimbursement, but for our purposes it was believed that smoothing would introduce an unnecessary complication.

Table 4-A2 presents a comparable set of age-sex-Medicaid status factors for persons with Part A costs over \$1,000 in the past calendar year (1992). This will normally involve a hospitalization but, in a few cases, could result from home health or SNF utilization only. The appropriate comparisons to Table 4-A1 should be made cell by cell. For example, from Table 4-A1, the Part A cost of females aged 85+ without Medicaid is 1.57 times the Part A cost of all aged enrollees. From Table 4-A2, the comparable cost of those with a hospitalization in the past year is 2.85 times the Part A cost of all aged enrollees, regardless of their prior hospital use. Generally, younger persons, who would normally have a lower average cost, have the higher multiple for having a hospitalization in the last year. For non-Medicaid females over age 85, those with a hospitalization in the past year are 82 percent (2.85/1.57) more expensive than all age 85+ females, but non-Medicaid females aged 65-69 with a hospitalization in the past year are almost four times more expensive than the average for all members of that group. The summary measures shown are not age-sex adjusted.

In Table 4-A3, factors are presented for those who had a hospitalization two years ago, but not in the past year. Table 4-A4 is for persons with a hospitalization in the third preceding year and Table 4-A5 for those who have not been hospitalized in the past 3 years. Each of these tables includes new entrants. Hospitalizations that occur before entry into Medicare are not counted for classification purposes. One implication of this is that new entrants are classified as lower-cost enrollees than is perhaps appropriate if

they had significant medical care prior to becoming Medicare eligible.

Generally, those without significant Part A costs in the past three years have current Part A costs about 60 percent of the overall average and 70 percent of the overall Part B average. This suggests the degree of possible bias in selection that can result from inadequate risk adjustment. Since over half of the population will not have had a hospitalization in the last three years, the potential for self- or plan-selection is significant.

To illustrate the use of this extended set of adjustment factors, we have applied these national factors to subsets of Medicare enrollees in Los Angeles and Cook counties. These counties were chosen for simplicity since they include the largest number of Medicare eligibles in single counties. Selecting the enrollees all from the same county eliminates the need for a geographic adjustment.

In Table 4-AU1, enrollees are assigned randomly to any one of nine groups. The present AAPCC method is simulated by applying the factors from Table 4-A1, i.e., without regard to their medical history. The select and ultimate method is based on the factors in Tables 4-A2 through 4-A5, i.e., considering the duration since their last hospitalization.

In Table 4-AU1, with enrollees assigned arbitrarily, the predictions of both methods are scattered randomly around the true mean expense of the group with no significant advantage for either method. The measure of fit used here is the mean squared error. In Table 4-AU2, plans 6 - 9 avoid half of the patients who had been hospitalized in the prior year at the expense of plans 1 - 4 who enroll them. For these purposes, it does not matter whether the plan or the enrollee instigated the selection. In this case, where the selection was based on part of the criteria used to develop the factors, the select and ultimate method performs substantially better than the present method, with mean squared errors about one-fourth those of the present method.

Table 4-AU3 presents a set of groups with a bias based on 1993 spending with no consideration given to medical history. Here, the improvement provided by the select and ultimate factors, as measured by the mean squared

error, is much more modest, suggesting that current medical care spending is explained only in part by prior hospitalizations.

The sequence of Tables 4-B1 through 4-BU3 follows a similar development, but using as a salient event the last year in which expenditures in either Part A or Part B exceeded \$1,000. Expenditures of over \$1,000 in either Part A or Part B in the prior year is associated with spending in the current year which is about twice as high as the overall average. In the lower-cost cells, costs are approximately tripled and in higher-cost cells costs increase by perhaps one-third. When an individual had no spending over \$1,000 in either Part A or Part B for the past three years, current spending was typically half of the aggregate level where medical history is not considered.

This set of risk adjusters was applied to Los Angeles and Cook counties in a fashion similar to that described above. Again, when the risk selection is purely random, there is no significant gain from the current method. If selection is related to the basis for establishing the risk adjusters, the select and ultimate method shows a pronounced improvement over the present adjustment formula. Table 4-BU3 shows that the ability of this set of predictors to work on a biased selection set that is independent of prior use is somewhat better than the use of prior hospitalization entirely.

Tables 4-C1 through 4-CU3 split the distribution of expenditures in 1991 into those with no expense and five quintiles for those with positive expense. The example in Table 4-CU2 is based on the assumption that any biased selection results from the individual's or the plan's knowledge of their prior experience, this time 1991 on the presumption that an intermediate year is needed between experience and application. The select and ultimate index performs much better than the present AAPCC here. When plans receive favorable selection by other means, however, there is a more modest advantage to the select and ultimate set of indices.

Tables 4-D1 through 4-DU3 determine a set of adjustments based on duration since total Medicare spending exceeded \$10,000. Individuals with spending over \$10,000 had expected current year spending of double the average

in high-cost cells and up to seven times the average in lower-cost age groups. The excess costs persisted for the three year history used here. Those without Medicare reimbursement over \$10,000 in the last three years typically had reimbursement about 70 percent of the aggregate.

Finally, Tables 4-E1 through 4-EU3 illustrate a risk adjustment based on duration since last positive reimbursable expense under Medicare. Table 4-EU2 shows a rather unrealistic selection severity so the improvements of the select and ultimate adjusters is unlikely to be of practical value. Still, accounting for prior history again provides some protection against favorable or unfavorable selection.

#### 4.4 Conclusion

Current levels of medical care use are closely correlated to an individual's medical history, but a major portion of expense is still unexplained by combinations of age, sex, Medicaid status, and history of medical care spending. As a result, prospective rate setting based on the administratively simple methods suggested here may help counter the effects of deliberate selection, but offer only modest relief from the effects of random variation in experience. Payment methods using select and ultimate rates are compared to other alternative payment methods in Chapter 6.

Appendix to Chapter 4



Table 4-A1: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2) ESRD  
All Enrollees

Part A	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
85+	3,983	4,607	3,512	4,074		1.54	1.78	1.36	1.57	
80-84	3,930	3,865	3,726	3,146		1.52	1.49	1.44	1.21	
75-79	3,727	3,109	3,390	2,481		1.44	1.20	1.31	0.96	
70-74	3,329	2,417	3,104	1,835		1.28	0.93	1.20	0.71	
65-69	3,133	1,780	2,864	1,399		1.21	0.69	1.11	0.54	
60-64	3,771	2,764	4,081	3,250	2,591	1.48	1.08	1.60	1.28	1.00
55-59	3,455	2,658	3,347	2,773		1.36	1.04	1.31	1.09	
45-54	2,788	1,927	3,095	2,276		1.09	0.76	1.21	0.89	
35-44	2,281	1,995	2,369	1,896		0.90	0.78	0.93	0.74	
<35	2,666	1,962	2,626	1,607		1.05	0.77	1.03	0.63	
Part B					2,548					1.00
85+	1,961	1,797	1,842	1,492		1.42	1.30	1.33	1.08	
80-84	1,974	1,820	1,834	1,462		1.43	1.31	1.32	1.06	
75-79	2,077	1,685	1,856	1,382		1.50	1.22	1.34	1.00	
70-74	1,987	1,404	1,808	1,181		1.43	1.01	1.31	0.85	
65-69	1,799	1,090	1,832	985		1.30	0.79	1.32	0.71	
60-64	1,933	1,386	2,341	1,783	1,385	1.27	0.91	1.54	1.17	1.00
55-59	1,933	1,419	1,909	1,586		1.27	0.93	1.26	1.04	
45-54	1,679	1,278	2,298	1,596		1.11	0.84	1.51	1.05	
35-44	1,607	1,179	1,772	1,194		1.06	0.78	1.17	0.79	
<35	1,421	884	1,877	1,025		0.94	0.58	1.24	0.68	
					1,516					1.00

Table 4-A2: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with Part A Reimbursement >\$1,000 in 1992

	MALE		FEMALE			MALE		FEMALE			
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		
Part A											
85+	5,805	8,006	5,200	7,375		2.24	3.09	2.01	2.85		
80-84	6,641	7,108	6,332	6,613		2.56	2.74	2.44	2.55		
75-79	6,327	6,568	6,193	6,105		2.44	2.53	2.39	2.36		
70-74	6,445	5,852	6,881	5,763		2.49	2.26	2.66	2.22		
65-69	7,389	5,399	6,160	5,522		2.85	2.08	2.38	2.13		
					6,334						2.44
60-64	8,256	8,344	10,140	9,767		3.24	3.27	3.98	3.83		
55-59	9,610	8,230	8,289	10,118		3.77	3.23	3.25	3.87		
45-54	8,154	6,888	8,086	8,453		3.20	2.70	3.17	3.32		
35-44	7,599	8,496	5,772	6,868		2.98	3.33	2.27	2.70		
<35	7,595	8,575	8,453	10,083		2.98	3.37	3.32	3.96		
					8,255						3.24
Part B											
85+	2,869	2,850	2,662	2,375		2.07	2.06	1.92	1.72		
80-84	3,029	2,959	2,740	2,530		2.19	2.14	1.98	1.83		
75-79	3,493	3,003	3,010	2,656		2.52	2.17	2.17	1.92		
70-74	3,528	2,933	3,481	2,704		2.55	2.12	2.51	1.95		
65-69	3,692	2,743	3,492	2,707		2.67	1.98	2.52	1.95		
					2,778						2.01
60-64	4,211	3,682	4,782	4,524		2.77	2.43	3.15	2.98		
55-59	5,106	4,452	3,966	4,994		3.36	2.93	2.61	3.29		
45-54	3,873	4,334	5,002	5,000		2.55	2.85	3.29	3.29		
35-44	4,105	4,273	4,142	3,937		2.70	2.81	2.73	2.59		
<35	3,800	3,535	4,729	4,320		2.50	2.33	3.11	2.85		
					4,315						2.84

**Table 4-A3: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (299) ESRD  
Persons with Part A Reimbursement >\$1,000 in 1991 but not in 1992**

Part A	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
85+	4,156	5,371	3,888	4,507		1.60	2.07	1.50	1.74	
80-84	3,931	4,488	3,990	4,001		1.52	1.73	1.54	1.54	
75-79	4,427	3,674	4,073	3,293		1.71	1.42	1.57	1.27	
70-74	4,880	3,037	3,502	2,657		1.88	1.17	1.35	1.03	
65-69	3,774	2,771	2,858	2,667		1.46	1.07	1.10	1.03	
					3,591					1.39
60-64	3,068	3,766	4,601	4,716		1.20	1.48	1.81	1.85	
55-59	1,835	2,736	5,032	3,775		0.72	1.07	1.97	1.48	
45-54	1,846	1,877	4,619	2,111		0.72	0.74	1.81	0.83	
35-44	3,213	3,160	2,809	3,077		1.26	1.24	1.10	1.21	
<35	5,189	1,967	4,027	5,182		2.04	0.77	1.58	2.03	
					3,317					1.30
Part B										
85+	1,790	2,097	1,886	1,662		1.29	1.51	1.36	1.20	
80-84	2,134	2,077	2,080	1,799		1.54	1.50	1.51	1.30	
75-79	2,420	2,125	2,270	1,829		1.75	1.53	1.64	1.32	
70-74	2,772	1,843	2,099	1,675		2.00	1.33	1.52	1.21	
65-69	2,141	1,754	2,296	1,683		1.55	1.27	1.66	1.22	
					1,871					1.35
60-64	2,305	2,223	2,750	2,203		1.52	1.46	1.81	1.45	
55-59	1,239	2,764	2,506	1,748		0.82	1.82	1.65	1.15	
45-54	2,087	1,999	2,793	1,836		1.37	1.32	1.84	1.21	
35-44	2,177	2,987	2,542	1,770		1.43	1.97	1.67	1.17	
<35	2,785	2,432	3,078	1,673		1.83	1.60	2.03	1.10	
					2,323					1.53

**Table 4-A4: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (299) ESRD  
sons with Part A Reimbursement >\$1,000 in 1990 but not in 1991 or 1992**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>										
85+	3,089	4,454	3,492	3,712		1.19	1.72	1.35	1.43	
80-84	3,139	3,323	3,883	3,358		1.21	1.28	1.50	1.30	
75-79	2,749	3,077	3,121	2,557		1.06	1.19	1.20	0.99	
70-74	2,986	2,579	3,402	2,065		1.15	1.00	1.31	0.80	
65-69	3,342	2,441	3,473	2,435		1.29	0.94	1.34	0.94	
					2,970					1.15
60-64	2,831	4,794	2,619	2,729		1.11	1.88	1.03	1.07	
55-59	2,140	4,239	5,110	2,220		0.84	1.66	2.01	0.87	
45-54	2,746	1,920	2,097	2,461		1.08	0.75	0.82	0.97	
35-44	1,644	2,473	2,739	3,404		0.65	0.97	1.07	1.34	
<35	4,912	4,042	696	259		1.93	1.59	0.27	0.10	
					2,914					1.14
<b>Part B</b>										
85+	1,681	1,798	1,917	1,446		1.21	1.30	1.38	1.04	
80-84	2,051	1,719	1,794	1,542		1.48	1.24	1.30	1.11	
75-79	2,007	1,801	1,803	1,523		1.45	1.30	1.30	1.10	
70-74	2,122	1,608	2,043	1,391		1.53	1.16	1.48	1.00	
65-69	1,740	1,421	1,940	1,492		1.26	1.03	1.40	1.08	
					1,300					1.16
60-64	1,697	1,863	2,213	2,075		1.12	1.23	1.46	1.37	
55-59	2,769	1,838	2,293	1,613		1.82	1.21	1.51	1.06	
45-54	1,456	1,790	2,008	3,229		0.96	1.18	1.32	2.13	
35-44	1,666	1,359	1,939	1,154		1.10	0.90	1.28	0.76	
<35	2,578	2,034	2,619	4,010		1.70	1.34	1.72	2.64	
					1,963					1.29

**Table 4-A5: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (299I ESRD)**  
**Persons with Part A Reimbursement not >\$1,000 in 1990, 1991 or 1992**

Part A	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
85+	2,926	2,963	2,443	2,691		1.13	1.14	0.94	1.04	
80-84	2,410	2,584	2,211	1,907		0.93	1.00	0.85	0.74	
75-79	2,542	1,966	2,064	1,471		0.98	0.76	0.80	0.57	
70-74	1,911	1,535	1,619	1,036		0.74	0.59	0.62	0.40	
65-69	2,003	1,269	2,008	891	1,555	0.77	0.49	0.77	0.34	
60-64	2,539	1,513	2,173	1,741		1.00	0.59	0.85	0.68	0.60
55-59	1,790	1,651	1,382	1,299		0.70	0.65	0.54	0.51	
45-54	1,396	1,116	1,395	1,298		0.55	0.44	0.55	0.51	
35-44	1,136	979	1,439	981		0.45	0.38	0.56	0.38	
<35	1,509	1,266	1,363	684	1,362	0.59	0.50	0.54	0.27	0.53
Part B										
85+	1,498	1,263	1,353	1,100		1.08	0.91	0.98	0.79	
80-84	1,256	1,348	1,277	1,065		0.91	0.97	0.92	0.77	
75-79	1,382	1,189	1,271	991		1.00	0.86	0.92	0.72	
70-74	1,247	974	1,115	841		0.90	0.70	0.81	0.61	
65-69	1,299	844	1,362	763	977	0.94	0.61	0.98	0.55	0.71
60-64	1,152	847	1,494	1,130		0.76	0.56	0.98	0.74	
55-59	940	783	1,127	911		0.62	0.52	0.74	0.60	
45-54	1,029	693	1,403	964		0.68	0.46	0.92	0.63	
35-44	1,034	612	1,071	742		0.68	0.40	0.71	0.49	
<35	851	513	1,115	635	884	0.56	0.34	0.73	0.42	0.58

**Table 4-AU1: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Randomly Assigned Elements

Group Plan	Los Angeles		Chicago		
	Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual	
1	Present Method Estimate	5,760	1.03	4,817	1.05
	Select & Ultimate Estimate	5,874	1.06	4,633	1.01
	Actual	5,566	1.00	4,583	1.00
2	Present Method Estimate	5,854	1.21	4,787	1.11
	Select & Ultimate Estimate	5,780	1.19	4,761	1.10
	Actual	4,850	1.00	4,327	1.00
3	Present Method Estimate	5,775	1.04	4,835	0.97
	Select & Ultimate Estimate	5,975	1.06	4,991	1.00
	Actual	5,527	1.00	4,975	1.00
4	Present Method Estimate	5,851	1.08	4,796	0.88
	Select & Ultimate Estimate	5,682	1.05	4,626	0.88
	Actual	5,421	1.00	5,459	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	5,857	0.96	4,753	1.08
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,838	0.97	4,820	1.04
	Select & Ultimate Estimate	5,664	0.94	4,574	0.99
	Actual	6,036	1.00	4,629	1.00
7	Present Method Estimate	5,822	0.83	4,763	0.94
	Select & Ultimate Estimate	6,040	0.86	4,762	0.94
	Actual	7,050	1.00	5,082	1.00
8	Present Method Estimate	5,833	1.01	4,838	1.07
	Select & Ultimate Estimate	5,666	0.98	5,021	1.11
	Actual	5,793	1.00	4,517	1.00
9	Present Method Estimate	5,775	0.96	4,815	0.92
	Select & Ultimate Estimate	5,787	0.96	4,896	0.93
	Actual	6,031	1.00	5,247	1.00
Average	Present Method Estimate	5,814	1.00	4,802	1.00
	Select & Ultimate Estimate	5,814	1.00	4,802	1.00
	Actual	5,818	1.00	4,803	1.00
Mean Squared Error	Present Method Estimate		0.010		0.006
	Select & Ultimate Estimate		0.009		0.006
	Actual		0.000		0.000

**Table 4-AU2: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Plans 6-9 pass half of 15 hospitalized patients to plans 1-4

Group Plan		Los Angeles		Chicago	
		Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual
1	Present Method Estimate	5,799	0.92	4,857	0.97
	Select & Ultimate Estimate	5,947	0.94	4,963	0.99
	Actual	6,332	1.00	5,032	1.00
2	Present Method Estimate	5,920	0.95	4,851	0.96
	Select & Ultimate Estimate	6,190	0.99	5,164	1.02
	Actual	6,225	1.00	5,077	1.00
3	Present Method Estimate	5,853	0.91	4,880	0.90
	Select & Ultimate Estimate	6,265	0.98	5,406	0.99
	Actual	6,404	1.00	5,435	1.00
4	Present Method Estimate	5,893	0.99	4,821	0.82
	Select & Ultimate Estimate	6,187	1.04	5,177	0.88
	Actual	5,949	1.00	5,867	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	6,086	1.00	4,755	1.08
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,796	1.13	4,772	1.16
	Select & Ultimate Estimate	5,106	1.00	4,175	1.02
	Actual	5,124	1.00	4,098	1.00
7	Present Method Estimate	5,734	1.03	4,682	1.10
	Select & Ultimate Estimate	5,394	0.97	4,215	0.99
	Actual	5,585	1.00	4,246	1.00
8	Present Method Estimate	5,745	1.21	4,783	1.23
	Select & Ultimate Estimate	5,209	1.10	4,521	1.16
	Actual	4,748	1.00	3,897	1.00
9	Present Method Estimate	5,717	1.05	4,784	1.01
	Select & Ultimate Estimate	5,606	1.03	4,505	0.95
	Actual	5,455	1.00	4,717	1.00
Average	Present Method Estimate	5,809	1.01	4,798	1.01
	Select & Ultimate Estimate	5,777	1.00	4,765	1.00
	Actual	5,768	1.00	4,753	1.00
Mean Squared Error	Present Method Estimate		0.009		0.016
	Select & Ultimate Estimate		0.002		0.005
	Actual		0.000		0.000

**Table 4-AU3: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Plans 6-9 pass half of 1993 hospitalized patients to plans 1-4, Presciently

Group Plan		Los Angeles		Chicago	
		Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual
1	Present Method Estimate	5,812	0.78	4,856	0.82
	Select & Ultimate Estimate	5,761	0.78	4,794	0.81
	Actual	7,408	1.00	5,940	1.00
2	Present Method Estimate	5,917	0.80	4,854	0.79
	Select & Ultimate Estimate	6,076	0.82	4,929	0.81
	Actual	7,374	1.00	6,110	1.00
3	Present Method Estimate	5,825	0.77	4,881	0.78
	Select & Ultimate Estimate	6,128	0.81	5,109	0.82
	Actual	7,564	1.00	6,243	1.00
4	Present Method Estimate	5,861	0.81	4,828	0.74
	Select & Ultimate Estimate	5,949	0.82	5,004	0.77
	Actual	7,252	1.00	6,540	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	6,086	1.00	4,755	1.08
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,779	1.57	4,770	1.65
	Select & Ultimate Estimate	5,326	1.45	4,358	1.51
	Actual	3,683	1.00	2,892	1.00
7	Present Method Estimate	5,733	1.41	4,678	1.58
	Select & Ultimate Estimate	5,522	1.36	4,504	1.52
	Actual	4,056	1.00	2,958	1.00
8	Present Method Estimate	5,778	1.79	4,782	1.65
	Select & Ultimate Estimate	5,360	1.66	4,887	1.69
	Actual	3,231	1.00	2,900	1.00
9	Present Method Estimate	5,754	1.50	4,774	1.25
	Select & Ultimate Estimate	5,894	1.54	4,715	1.23
	Actual	3,835	1.00	3,827	1.00
Average	Present Method Estimate	5,809	1.04	4,797	1.03
	Select & Ultimate Estimate	5,789	1.03	4,784	1.03
	Actual	5,610	1.00	4,646	1.00
Mean Squared Error	Present Method Estimate		0.172		0.160
	Select & Ultimate Estimate		0.133		0.136
	Actual		0.000		0.000



**Table 4-B1: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD) Enrollees**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>										
85+	3,983	4,607	3,512	4,074		1.54	1.78	1.36	1.57	
80-84	3,930	3,865	3,726	3,146		1.52	1.49	1.44	1.21	
75-79	3,727	3,109	3,390	2,481		1.44	1.20	1.31	0.96	
70-74	3,329	2,417	3,104	1,835		1.28	0.93	1.20	0.71	
65-69	3,133	1,780	2,864	1,399	2,591	1.21	0.69	1.11	0.54	
60-64	3,771	2,764	4,081	3,250		1.48	1.08	1.60	1.28	1.00
55-59	3,455	2,658	3,347	2,773		1.36	1.04	1.31	1.09	
45-54	2,788	1,927	3,095	2,276		1.09	0.76	1.21	0.89	
35-44	2,281	1,995	2,369	1,896		0.90	0.78	0.93	0.74	
<35	2,666	1,962	2,626	1,607	2,548	1.05	0.77	1.03	0.63	1.00
<b>Part B</b>										
85+	1,961	1,797	1,842	1,492		1.42	1.30	1.33	1.08	
80-84	1,974	1,820	1,834	1,462		1.43	1.31	1.32	1.06	
75-79	2,077	1,685	1,856	1,382		1.50	1.22	1.34	1.00	
70-74	1,987	1,404	1,808	1,181		1.43	1.01	1.31	0.85	
65-69	1,799	1,090	1,832	985	1,385	1.30	0.79	1.32	0.71	1.00
60-64	1,933	1,386	2,341	1,783		1.27	0.91	1.54	1.17	
55-59	1,933	1,419	1,909	1,586		1.27	0.93	1.26	1.04	
45-54	1,679	1,278	2,298	1,596		1.11	0.84	1.51	1.05	
35-44	1,607	1,179	1,772	1,194		1.06	0.78	1.17	0.79	
<35	1,421	884	1,877	1,025	1,518	0.94	0.58	1.24	0.68	1.00

**Table 4-B2: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with Reimbursement >\$1,000 Part A or Part B in 1992**

Part A	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
85+	5,172	6,690	4,756	6,218		2.00	2.58	1.84	2.40	
80-84	5,520	5,925	5,339	5,164		2.13	2.29	2.06	1.99	
75-79	5,439	5,155	5,288	4,604		2.10	1.99	2.04	1.78	
70-74	5,593	4,536	5,134	3,974		2.16	1.75	1.98	1.53	
65-69	5,751	4,294	4,857	3,877		2.22	1.66	1.87	1.50	
					4,936					1.91
60-64	6,438	6,468	7,090	7,385		2.53	2.54	2.78	2.90	
55-59	7,557	6,498	6,040	7,442		2.97	2.55	2.37	2.92	
45-54	6,001	5,304	5,622	5,836		2.36	2.08	2.21	2.29	
35-44	4,988	6,249	4,409	5,437		1.96	2.45	1.73	2.13	
<35	6,644	7,255	6,263	6,452		2.61	2.85	2.46	2.53	
					6,178					2.42
Part B										
85+	2,844	2,675	2,603	2,251		2.05	1.93	1.88	1.63	
80-84	2,795	2,781	2,660	2,301		2.02	2.01	1.92	1.66	
75-79	3,240	2,774	2,827	2,377		2.34	2.00	2.04	1.72	
70-74	3,324	2,633	3,009	2,297		2.40	1.90	2.17	1.66	
65-69	3,468	2,514	3,264	2,329		2.50	1.82	2.36	1.68	
					2,519					1.82
60-64	3,709	3,469	3,879	3,856		2.44	2.29	2.55	2.54	
55-59	4,210	4,075	3,346	4,024		2.77	2.68	2.20	2.65	
45-54	3,479	3,879	3,995	4,198		2.29	2.55	2.63	2.77	
35-44	3,661	4,012	3,477	3,360		2.41	2.64	2.29	2.21	
<35	3,569	3,753	4,397	3,690		2.35	2.47	2.90	2.43	
					3,799					2.50

Table 4-B3: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESF)  
 Parents with Reimbursement >\$1,000 Part A or Part B in 1991 but not in 1992

	MALE		FEMALE			MALE		FEMALE			
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		
Part A											
85+	3,383	3,890	2,695	3,294		1.31	1.50	1.04	1.27		
80-84	3,029	2,938	3,434	2,506		1.17	1.13	1.33	0.97		
75-79	2,414	2,521	2,916	1,827		0.93	0.97	1.13	0.71		
70-74	3,615	2,152	2,579	1,511		1.40	0.83	1.00	0.58		
65-69	3,011	1,855	2,391	1,271		1.16	0.72	0.92	0.49		
					2,308						0.89
60-64	828	2,726	846	1,327		0.32	1.07	0.33	0.52		
55-59	1,062	1,940	1,973	1,442		0.42	0.76	0.77	0.57		
45-54	1,027	1,698	1,958	1,596		0.40	0.67	0.77	0.63		
35-44	1,641	1,144	2,277	1,738		0.64	0.45	0.89	0.68		
<35	1,656	563	1,280	1,314		0.65	0.22	0.50	0.52		
					1,659						0.65
Part B											
85+	1,356	1,475	1,352	1,245		0.98	1.07	0.98	0.90		
80-84	1,446	1,454	1,393	1,292		1.04	1.05	1.01	0.93		
75-79	1,223	1,450	1,565	1,204		0.88	1.05	1.13	0.87		
70-74	2,135	1,338	1,434	1,146		1.54	0.97	1.04	0.83		
65-69	1,580	1,204	1,314	1,065		1.14	0.87	0.95	0.77		
					1,285						0.93
60-64	792	1,016	1,061	997		0.52	0.67	0.70	0.66		
55-59	720	932	1,480	980		0.47	0.61	0.97	0.65		
45-54	890	982	1,226	966		0.59	0.65	0.81	0.64		
35-44	836	778	1,221	1,073		0.55	0.51	0.80	0.71		
<35	758	445	810	664		0.50	0.29	0.53	0.44		
					953						0.63

**Table 4-B4: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (299i ESRD)**  
**F** **sons with Reimbursement >\$1,000 Part A or B in 1990 but not in 1991 or 1992**

	MALE		FEMALE		MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>									
85+	2,822	3,538	2,536	2,900	1.09	1.37	0.98	1.12	
80-84	2,191	2,807	2,612	2,237	0.85	1.08	1.01	0.86	
75-79	2,129	2,260	1,322	1,632	0.82	0.87	0.51	0.63	
70-74	2,047	1,850	1,871	1,361	0.79	0.71	0.72	0.53	
65-69	2,772	1,801	2,350	1,334	1.07	0.70	0.91	0.51	
					2,057				0.79
60-64	1,476	2,057	1,488	1,562	0.58	0.81	0.58	0.61	
55-59	3,978	2,227	3,416	1,369	1.56	0.87	1.34	0.54	
45-54	637	763	1,068	503	0.25	0.30	0.42	0.20	
35-44	688	1,195	897	383	0.27	0.47	0.35	0.15	
<35	4,367	270	365	1,681	1.71	0.11	0.14	0.66	
					1,378				0.54
<b>Part B</b>									
85+	1,023	1,334	1,174	1,077	0.74	0.96	0.85	0.78	
80-84	1,561	1,265	1,129	1,085	1.13	0.91	0.82	0.78	
75-79	1,617	1,206	1,066	1,046	1.17	0.87	0.77	0.76	
70-74	1,485	1,071	1,167	1,005	1.07	0.77	0.84	0.73	
65-69	1,319	1,050	1,208	901	0.95	0.76	0.87	0.65	
					1,097				0.79
60-64	765	935	1,463	1,105	0.50	0.62	0.96	0.73	
55-59	1,496	655	1,174	1,045	0.99	0.43	0.77	0.69	
45-54	731	654	757	652	0.48	0.43	0.50	0.43	
35-44	773	549	773	569	0.51	0.36	0.51	0.37	
<35	1,807	112	449	428	1.19	0.07	0.30	0.28	
					803				0.53

Table 4-B5: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
 Persons with Reimbursement <\$1,000, Part A and Part B, in 1990, 1991 and 1992

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
Part A										
85+	2,463	2,442	2,054	2,139		0.95	0.94	0.79	0.83	
80-84	2,094	2,017	1,447	1,489		0.81	0.78	0.56	0.57	
75-79	2,452	1,558	1,350	1,145		0.95	0.60	0.52	0.44	
70-74	1,417	1,268	1,226	780		0.55	0.49	0.47	0.30	
65-69	1,694	1,090	1,654	748		0.65	0.42	0.64	0.29	
					1,206					0.47
60-64	2,422	1,341	2,009	1,344		0.95	0.53	0.79	0.53	
55-59	989	1,462	1,314	935		0.39	0.57	0.52	0.37	
45-54	1,106	902	1,258	971		0.43	0.35	0.49	0.38	
35-44	979	783	977	736		0.38	0.31	0.38	0.29	
<35	1,000	939	886	512		0.39	0.37	0.35	0.20	
					1,085					0.43
Part B										
85+	957	896	964	793		0.69	0.65	0.70	0.57	
80-84	931	944	862	734		0.67	0.68	0.62	0.53	
75-79	1,078	837	773	703		0.78	0.60	0.56	0.51	
70-74	818	714	703	588		0.59	0.52	0.51	0.42	
65-69	917	695	1,004	620		0.66	0.50	0.72	0.45	
					709					0.51
60-64	816	640	1,147	787		0.54	0.42	0.76	0.52	
55-59	604	623	820	607		0.40	0.41	0.54	0.40	
45-54	666	481	1,137	636		0.44	0.32	0.75	0.42	
35-44	640	361	677	463		0.42	0.24	0.45	0.30	
<35	554	306	680	460		0.36	0.20	0.45	0.30	
					599					0.39

**Table 4-BU1: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Randomly Assigned Enrollees, Index based on prior part A or B expenses > \$1,000

Group Plan		Los Angeles		Chicago	
		Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual
1	Present Method Estimate	5,760	1.03	4,817	1.05
	Select & Ultimate Estimate	5,623	1.01	4,635	1.01
	Actual	5,566	1.00	4,583	1.00
2	Present Method Estimate	5,854	1.2*	4,787	1.11
	Select & Ultimate Estimate	5,763	1.19	4,723	1.09
	Actual	4,850	1.00	4,327	1.00
3	Present Method Estimate	5,775	1.04	4,835	0.97
	Select & Ultimate Estimate	5,884	1.06	4,979	1.00
	Actual	5,527	1.00	4,975	1.00
4	Present Method Estimate	5,851	1.08	4,795	0.88
	Select & Ultimate Estimate	5,786	1.07	4,849	0.89
	Actual	5,421	1.00	5,459	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	6,086	1.00	4,755	1.08
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,838	0.97	4,819	1.04
	Select & Ultimate Estimate	5,519	0.91	4,571	0.99
	Actual	6,036	1.00	4,629	1.00
7	Present Method Estimate	5,822	0.83	4,764	0.94
	Select & Ultimate Estimate	5,912	0.84	4,755	0.94
	Actual	7,050	1.00	5,082	1.00
8	Present Method Estimate	5,834	1.01	4,838	1.07
	Select & Ultimate Estimate	5,696	0.98	5,041	1.12
	Actual	5,793	1.00	4,517	1.00
9	Present Method Estimate	5,776	0.96	4,815	0.92
	Select & Ultimate Estimate	6,063	1.01	4,908	0.94
	Actual	6,031	1.00	5,247	1.00
Average	Present Method Estimate	5,814	1.00	4,802	1.00
	Select & Ultimate Estimate	5,815	1.00	4,802	1.00
	Actual	5,818	1.00	4,803	1.00
Mean Squared Error	Present Method Estimate		0.010		0.006
	Select & Ultimate Estimate		0.009		0.005
	Actual		0.000		0.000

**Table 4-BU2: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Plans 6-9 pass half of payments with 1990-92 expenses > \$1,000 in Part A or B to plans 1-4

Group Plan		Los Angeles		Chicago	
		Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual
1	Present Method Estimate	5,832	0.95	4,875	0.95
	Select & Ultimate Estimate	6,157	1.01	5,089	1.00
	Actual	6,112	1.00	5,113	1.00
2	Present Method Estimate	5,905	0.93	4,860	0.94
	Select & Ultimate Estimate	6,387	1.00	5,254	1.02
	Actual	6,361	1.00	5,148	1.00
3	Present Method Estimate	5,872	0.90	4,897	0.93
	Select & Ultimate Estimate	6,476	1.00	5,498	1.05
	Actual	6,488	1.00	5,250	1.00
4	Present Method Estimate	5,904	0.97	4,859	0.84
	Select & Ultimate Estimate	6,392	1.05	5,349	0.92
	Actual	6,100	1.00	5,795	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	6,086	1.00	4,755	1.08
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,735	1.10	4,727	1.25
	Select & Ultimate Estimate	4,500	0.86	3,828	1.01
	Actual	5,212	1.00	3,793	1.00
7	Present Method Estimate	5,713	1.11	4,638	1.16
	Select & Ultimate Estimate	4,819	0.93	3,902	0.98
	Actual	5,162	1.00	3,983	1.00
8	Present Method Estimate	5,676	1.39	4,737	1.21
	Select & Ultimate Estimate	4,480	1.10	4,203	1.07
	Actual	4,075	1.00	3,914	1.00
9	Present Method Estimate	5,639	1.13	4,713	1.02
	Select & Ultimate Estimate	5,022	1.00	4,080	0.89
	Actual	5,003	1.00	4,610	1.00
Average	Present Method Estimate	5,788	1.03	4,784	1.02
	Select & Ultimate Estimate	5,591	0.99	4,662	1.00
	Actual	5,622	1.00	4,668	1.00
Mean Squared Error	Present Method Estimate		0.023		0.019
	Select & Ultimate Estimate		0.004		0.004
	Actual		0.000		0.000

**Table 4-BU3: Comparison of Present AAPCC with Select and Ultimate A PCC, 1993**

Plans 6-9 pass half of patients with 1993 expenses >\$1,000 in Part A or B to plans 1-4, Presciently

Group Plan	Los Angeles		Chicago		
	Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual	
1	Present Method Estimate	5,842	0.84	4,858	0.84
	Select & Ultimate Estimate	5,988	0.86	4,835	0.83
	Actual	6,991	1.00	5,795	1.00
2	Present Method Estimate	5,933	0.85	4,849	0.82
	Select & Ultimate Estimate	6,174	0.88	4,986	0.85
	Actual	6,987	1.00	5,891	1.00
3	Present Method Estimate	5,846	0.82	4,886	0.81
	Select & Ultimate Estimate	6,269	0.88	5,215	0.86
	Actual	7,105	1.00	6,056	1.00
4	Present Method Estimate	5,876	0.87	4,830	0.77
	Select & Ultimate Estimate	6,156	0.91	5,095	0.81
	Actual	6,765	1.00	6,269	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	6,086	1.00	4,755	1.08
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,725	1.50	4,760	1.65
	Select & Ultimate Estimate	4,889	1.28	4,270	1.48
	Actual	3,823	1.00	2,891	1.00
7	Present Method Estimate	5,679	1.35	4,669	1.57
	Select & Ultimate Estimate	5,273	1.26	4,380	1.47
	Actual	4,193	1.00	2,983	1.00
8	Present Method Estimate	5,734	1.77	4,767	1.63
	Select & Ultimate Estimate	4,989	1.54	4,725	1.61
	Actual	3,237	1.00	2,927	1.00
9	Present Method Estimate	5,713	1.41	4,767	1.20
	Select & Ultimate Estimate	5,551	1.37	4,550	1.14
	Actual	4,050	1.00	3,976	1.00
Average	Present Method Estimate	5,797	1.06	4,793	1.05
	Select & Ultimate Estimate	5,708	1.04	4,757	1.04
	Actual	5,471	1.00	4,577	1.00
Mean Squared Error	Present Method Estimate		0.137		0.147
	Select & Ultimate Estimate		0.070		0.106
	Actual		0.000		0.000



**Table 4-C1: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
 †† Enrollees**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>										
85+	3,983	4,607	3,512	4,074		1.54	1.78	1.36	1.57	
80-84	3,930	3,865	3,726	3,146		1.52	1.49	1.44	1.21	
75-79	3,727	3,109	3,390	2,481		1.44	1.20	1.31	0.96	
70-74	3,329	2,417	3,104	1,835		1.28	0.93	1.20	0.71	
65-69	3,133	1,780	2,864	1,399		1.21	0.69	1.11	0.54	
					2,591					1.00
60-64	3,771	2,764	4,081	3,250		1.48	1.08	1.60	1.28	
55-59	3,455	2,658	3,347	2,773		1.36	1.04	1.31	1.09	
45-54	2,788	1,927	3,095	2,276		1.09	0.76	1.21	0.89	
35-44	2,281	1,995	2,369	1,896		0.90	0.78	0.93	0.74	
<35	2,666	1,962	2,626	1,607		1.05	0.77	1.03	0.63	
					2,548					1.00
<b>Part B</b>										
85+	1,961	1,797	1,842	1,492		1.42	1.30	1.33	1.08	
80-84	1,974	1,820	1,834	1,462		1.43	1.31	1.32	1.06	
75-79	2,077	1,685	1,856	1,382		1.50	1.22	1.34	1.00	
70-74	1,987	1,404	1,808	1,181		1.43	1.01	1.31	0.85	
65-69	1,799	1,090	1,832	985		1.30	0.79	1.32	0.71	
					1,385					1.00
60-64	1,933	1,386	2,341	1,783		1.27	0.91	1.54	1.17	
55-59	1,933	1,419	1,909	1,586		1.27	0.93	1.26	1.04	
45-54	1,679	1,278	2,298	1,596		1.11	0.84	1.51	1.05	
35-44	1,607	1,179	1,772	1,194		1.06	0.78	1.17	0.79	
<35	1,421	884	1,877	1,025		0.94	0.58	1.24	0.68	
					1,518					1.00

**Table 4-C2: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
 persons with no payments in 1991 (including errata after 1991)**

	MALE		FEMALE		MALE		FEMALE	
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid
<b>Part A</b>								
85+	3,337	2,509	2,636	2,403	1.29	0.97	1.02	0.93
80-84	2,051	2,273	2,982	1,830	0.79	0.88	1.15	0.71
75-79	2,712	1,713	1,782	1,395	1.05	0.66	0.69	0.54
70-74	1,393	1,511	1,340	915	0.54	0.58	0.52	0.35
65-69	2,292	1,275	2,156	978	0.88	0.49	0.83	0.38
					1,391			0.54
60-64	3,036	1,604	3,556	2,339	1.19	0.63	1.40	0.92
55-59	2,730	1,710	2,456	1,958	1.07	0.67	0.96	0.77
45-54	1,951	1,322	2,038	1,604	0.77	0.52	0.80	0.63
35-44	1,297	1,122	1,644	1,097	0.51	0.44	0.65	0.43
<35	2,192	1,195	2,521	782	0.86	0.47	0.99	0.31
					1,658			0.65
<b>Part B</b>								
85+	1,199	797	1,098	655	0.87	0.58	0.79	0.47
80-84	826	902	1,183	683	0.60	0.65	0.85	0.49
75-79	1,227	786	952	593	0.89	0.57	0.69	0.43
70-74	902	662	660	489	0.65	0.48	0.48	0.35
65-69	1,174	780	1,387	699	0.85	0.56	1.00	0.51
					726			0.52
60-64	1,014	705	1,590	1,194	0.67	0.46	1.05	0.79
55-59	1,178	780	1,282	902	0.78	0.51	0.84	0.59
45-54	1,270	692	1,626	1,061	0.84	0.46	1.07	0.70
35-44	928	535	1,166	676	0.61	0.35	0.77	0.45
<35	969	553	1,369	658	0.64	0.36	0.90	0.43
					868			0.57

**Table 4-C3: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)**  
**Persons with Reimbursement in first quintile of positive payments in 199**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>										
85+	2,627	3,473	2,294	2,793		1.01	1.34	0.89	1.08	
80-84	4,505	2,729	2,235	1,874		1.74	1.05	0.86	0.72	
75-79	2,053	2,078	2,463	1,474		0.79	0.80	0.95	0.57	
70-74	2,539	1,650	1,849	1,037		0.98	0.64	0.71	0.40	
65-69	2,396	1,366	2,036	975		0.92	0.53	0.79	0.38	
					1,692					0.65
60-64	2,973	2,001	2,447	1,577		1.17	0.79	0.96	0.62	
55-59	1,486	2,027	1,952	1,875		0.58	0.80	0.77	0.74	
45-54	1,435	1,074	951	1,140		0.56	0.42	0.37	0.45	
35-44	716	1,127	815	826		0.28	0.44	0.32	0.32	
<35	927	2,207	854	871		0.36	0.87	0.34	0.34	
					1,405					0.55
<b>Part B</b>										
85+	1,070	1,143	1,160	894		0.77	0.83	0.84	0.65	
80-84	1,461	1,187	923	811		1.06	0.86	0.67	0.59	
75-79	1,078	1,035	1,019	768		0.78	0.75	0.74	0.55	
70-74	1,122	922	838	658		0.81	0.67	0.60	0.48	
65-69	1,079	847	1,113	686		0.78	0.61	0.80	0.50	
					850					0.61
60-64	844	875	1,179	811		0.56	0.58	0.78	0.53	
55-59	814	902	850	1,217		0.54	0.59	0.56	0.80	
45-54	781	780	869	728		0.51	0.51	0.57	0.48	
35-44	509	512	578	494		0.34	0.34	0.38	0.33	
<35	413	509	800	611		0.27	0.34	0.53	0.40	
					745					0.49

**Table 4-C4: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
 Persons with Reimbursement in 2nd Quintile of Positive Payments in 1991**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>										
85+	2,467	3,877	2,340	3,069		0.95	1.50	0.90	1.18	
80-84	2,577	2,938	2,632	2,467		0.99	1.13	1.02	0.95	
75-79	3,033	2,571	1,847	1,756		1.17	0.99	0.71	0.68	
70-74	2,860	1,861	2,127	1,311		1.10	0.72	0.82	0.51	
65-69	2,352	2,105	1,980	1,138		0.91	0.81	0.76	0.44	
					2,052					0.79
60-64	2,140	2,212	3,198	2,293		0.84	0.87	1.25	0.90	
55-59	2,582	2,157	2,239	1,031		1.01	0.85	0.88	0.40	
45-54	1,840	2,102	2,069	1,743		0.72	0.83	0.81	0.68	
35-44	1,374	1,285	1,554	1,477		0.54	0.50	0.61	0.58	
<35	1,060	1,675	722	717		0.42	0.66	0.28	0.28	
					1,823					0.72
<b>Part B</b>										
85+	1,353	1,521	1,223	1,191		0.98	1.10	0.88	0.86	
80-84	1,569	1,404	1,189	1,128		1.13	1.01	0.86	0.81	
75-79	1,700	1,332	1,029	1,073		1.23	0.96	0.74	0.77	
70-74	1,516	1,237	1,131	934		1.09	0.89	0.82	0.67	
65-69	1,273	1,190	1,187	922		0.92	0.86	0.86	0.67	
					1,137					0.82
60-64	1,301	1,134	1,406	1,299		0.86	0.75	0.93	0.86	
55-59	1,070	1,259	1,271	687		0.71	0.83	0.84	0.45	
45-54	898	689	1,668	953		0.59	0.45	1.10	0.63	
35-44	743	759	797	684		0.49	0.50	0.53	0.45	
<35	824	605	987	618		0.54	0.40	0.65	0.41	
					976					0.64

Table 4-C5: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with Reimbursement in 3rd Quintile of Positive Payments in 1991

	MALE		FEMALE			MALE		FEMALE			
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		
Part A											
85+	4,045	3,998	3,170	3,846		1.56	1.54	1.22	1.48		
80-84	3,295	3,717	2,729	2,604		1.27	1.43	1.05	1.00		
75-79	3,917	3,056	2,463	2,263		1.51	1.18	0.95	0.87		
70-74	2,704	2,453	2,551	1,845		1.04	0.95	0.98	0.64		
65-69	3,367	2,373	3,113	1,600	2,569	1.30	0.92	1.20	0.62		0.99
60-64	2,826	2,494	2,564	1,932		1.11	0.98	1.01	0.76		
55-59	2,732	3,129	3,355	1,010		1.07	1.23	1.32	0.40		
45-54	1,114	2,068	1,912	992		0.44	0.81	0.75	0.39		
35-44	1,076	1,417	1,710	803		0.42	0.56	0.67	0.32		
<35	3,113	2,827	1,247	1,623	1,960	1.22	1.11	0.49	0.64		0.77
Part B											
85+	1,768	1,763	1,655	1,565		1.28	1.27	1.20	1.13		
80-84	1,945	1,875	1,671	1,456		1.40	1.35	1.21	1.05		
75-79	1,880	1,773	1,522	1,450		1.36	1.28	1.10	1.05		
70-74	1,757	1,554	1,665	1,285		1.27	1.12	1.20	0.93		
65-69	1,688	1,521	1,688	1,284	1,516	1.22	1.10	1.22	0.93		1.09
60-64	1,506	1,485	2,098	1,577		0.99	0.98	1.38	1.04		
55-59	1,224	1,233	1,961	1,118		0.81	0.81	1.29	0.74		
45-54	1,033	1,288	1,243	1,012		0.68	0.85	0.82	0.67		
35-44	1,217	951	1,246	918		0.80	0.63	0.82	0.60		
<35	1,944	1,062	1,305	1,287	1,334	1.28	0.70	0.86	0.85		0.88

**Table 4-C6: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with Reimbursement in 4th Quintile of Positive Payments in 1991**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
Part A										
85+	3,910	4,940	3,523	4,399		1.51	1.91	1.36	1.70	
80-84	4,374	4,009	3,926	3,436		1.69	1.55	1.52	1.33	
75-79	3,841	3,312	3,820	2,771		1.48	1.28	1.47	1.07	
70-74	4,139	3,113	3,370	2,308		1.60	1.20	1.30	0.89	
65-69	4,202	2,592	3,105	2,139		1.62	1.00	1.20	0.83	
					3,221					1.24
60-64	4,226	4,645	4,484	3,986		1.66	1.82	1.76	1.56	
55-59	2,024	3,696	2,184	3,380		0.79	1.45	0.86	1.33	
45-54	3,395	2,403	2,456	2,579		1.33	0.94	0.96	1.01	
35-44	2,366	2,486	2,584	4,252		0.93	0.98	1.01	1.67	
<35	2,513	3,686	2,213	1,241		0.99	1.45	0.87	0.49	
					3,166					1.24
Part B										
85+	2,197	2,157	1,959	1,838		1.59	1.56	1.41	1.33	
80-84	2,172	2,119	2,136	1,840		1.57	1.53	1.54	1.33	
75-79	2,242	2,087	2,182	1,821		1.62	1.51	1.58	1.31	
70-74	2,588	1,985	2,252	1,716		1.87	1.43	1.63	1.24	
65-69	3,414	1,740	2,175	1,672		2.47	1.26	1.57	1.21	
					1,906					1.38
60-64	2,332	1,983	2,715	2,056		1.54	1.31	1.79	1.35	
55-59	1,700	1,874	1,907	2,316		1.12	1.23	1.26	1.53	
45-54	2,099	1,890	2,419	1,915		1.38	1.25	1.59	1.26	
35-44	1,753	2,011	1,957	1,988		1.15	1.32	1.29	1.31	
<35	1,882	937	1,733	1,253		1.24	0.62	1.14	0.82	
					1,995					1.31

**Table 4-C7: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with Reimbursement in 5th Quintile of Positive Payments in 1991**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>										
85+	5,558	7,568	5,151	6,757		2.15	2.92	1.99	2.61	
80-84	5,650	6,652	5,868	6,119		2.18	2.57	2.26	2.36	
75-79	5,969	5,841	6,010	5,469		2.30	2.25	2.32	2.11	
70-74	6,493	4,972	6,139	5,134		2.51	1.92	2.37	1.98	
65-69	6,140	4,983	5,982	5,479		2.37	1.92	2.31	2.11	
					5,819					2.25
60-64	6,693	7,410	7,032	9,550		2.63	2.91	2.76	3.75	
55-59	7,989	7,510	7,680	10,164		3.14	2.95	3.01	3.99	
45-54	6,828	5,421	8,026	8,099		2.68	2.13	3.15	3.18	
35-44	7,874	8,113	5,532	5,740		3.09	3.18	2.17	2.25	
<35	7,975	7,039	7,169	11,644		3.13	2.76	2.81	4.57	
					7,467					2.93
<b>Part B</b>										
85+	2,887	2,861	2,722	2,314		2.08	2.07	1.97	1.67	
80-84	3,065	3,005	2,774	2,533		2.21	2.17	2.00	1.83	
75-79	3,715	3,062	3,271	2,608		2.68	2.21	2.36	1.88	
70-74	4,078	2,849	3,510	2,669		2.94	2.06	2.53	1.93	
65-69	3,753	2,943	4,122	3,015		2.71	2.13	2.98	2.18	
					2,813					2.03
60-64	4,427	4,321	4,516	5,167		2.92	2.85	2.97	3.40	
55-59	5,034	5,237	4,105	5,626		3.32	3.45	2.70	3.71	
45-54	3,845	4,917	5,213	5,842		2.53	3.24	3.43	3.85	
35-44	5,218	5,145	4,520	4,128		3.44	3.39	2.98	2.72	
<35	4,327	4,366	5,595	4,940		2.85	2.88	3.68	3.25	
					4,838					3.19

**Table 4-CU1: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Randomly Assigned Enrollees

Select and Ultimate AAPCC Based on Quintile Index

		Los Angeles		Chicago	
Group Plan		Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual
1	Present Method Estimate	5,760	1.03	4,817	1.05
	Select & Ultimate Estimate	5,663	1.02	4,899	1.07
	Actual	5,566	1.00	4,583	1.00
2	Present Method Estimate	5,854	1.21	4,787	1.11
	Select & Ultimate Estimate	5,879	1.21	4,692	1.08
	Actual	4,850	1.00	4,327	1.00
3	Present Method Estimate	5,775	1.04	4,835	0.97
	Select & Ultimate Estimate	5,892	1.07	4,839	0.97
	Actual	5,527	1.00	4,975	1.00
4	Present Method Estimate	5,851	1.08	4,795	0.88
	Select & Ultimate Estimate	5,780	1.07	4,939	0.90
	Actual	5,421	1.00	5,459	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	5,965	0.98	4,689	1.06
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,838	0.97	4,819	1.04
	Select & Ultimate Estimate	5,747	0.95	4,607	1.00
	Actual	6,036	1.00	4,629	1.00
7	Present Method Estimate	5,822	0.83	4,764	0.94
	Select & Ultimate Estimate	5,867	0.83	4,792	0.94
	Actual	7,050	1.00	5,082	1.00
8	Present Method Estimate	5,834	1.01	4,838	1.07
	Select & Ultimate Estimate	5,718	0.99	4,989	1.10
	Actual	5,793	1.00	4,517	1.00
9	Present Method Estimate	5,776	0.96	4,815	0.92
	Select & Ultimate Estimate	5,822	0.97	4,767	0.91
	Actual	6,031	1.00	5,247	1.00
Average	Present Method Estimate	5,814	1.00	4,802	1.00
	Select & Ultimate Estimate	5,815	1.00	4,801	1.00
	Actual	5,818	1.00	4,803	1.00
Mean Squared Error	Present Method Estimate		0.010		0.006
	Select & Ultimate Estimate		0.010		0.005
	Actual		0.000		0.000



**Table 4-CU2: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Plans 6-9 pass, half of patents with > \$5,000 in 1991 to plans 1-4  
 Select and Ultimate AAPCC Based on Quintile Index

Group Plan	Los Angeles		Chicago		
	Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual	
1 Present Method Estimate	5,811	0.93	4,843	0.98	
	Select & Ultimate Estimate	6,115	0.98	5,194	1.05
	Actual	6,246	1.00	4,958	1.00
2 Present Method Estimate	5,869	0.99	4,831	1.03	
	Select & Ultimate Estimate	6,288	1.06	5,106	1.09
	Actual	5,936	1.00	4,701	1.00
3 Present Method Estimate	5,838	0.90	4,860	0.94	
	Select & Ultimate Estimate	6,345	0.97	5,253	1.02
	Actual	6,513	1.00	5,151	1.00
4 Present Method Estimate	5,859	0.94	4,820	0.79	
	Select & Ultimate Estimate	6,196	1.00	5,280	0.87
	Actual	6,212	1.00	6,085	1.00
5 Present Method Estimate	5,822	0.96	4,751	1.08	
	Select & Ultimate Estimate	5,965	0.98	4,689	1.06
	Actual	6,086	1.00	4,405	1.00
6 Present Method Estimate	5,781	1.11	4,790	1.14	
	Select & Ultimate Estimate	5,182	0.99	4,258	1.01
	Actual	5,221	1.00	4,207	1.00
7 Present Method Estimate	5,801	0.98	4,711	1.00	
	Select & Ultimate Estimate	5,379	0.90	4,322	0.92
	Actual	5,947	1.00	4,709	1.00
8 Present Method Estimate	5,764	1.24	4,809	1.12	
	Select & Ultimate Estimate	5,156	1.11	4,522	1.06
	Actual	4,632	1.00	4,280	1.00
9 Present Method Estimate	5,759	1.12	4,787	1.06	
	Select & Ultimate Estimate	5,336	1.04	4,358	0.97
	Actual	5,153	1.00	4,501	1.00
Average Present Method Estimate	5,811	1.01	4,800	1.00	
	Select & Ultimate Estimate	5,774	1.00	4,776	1.00
	Actual	5,772	1.00	4,777	1.00
Mean Squared Error	Present Method Estimate	0.012		0.010	
	Select & Ultimate Estimate	0.003		0.005	
	Actual	0.000		0.000	

**Table 4-CU3: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Plans 6-9 pass half of patients with > \$5,000 in 1993 to plans 1-4. Presently  
 Select and Ultimate AAPCC Based on Quintile Index

Group Plan		Los Angeles		Chicago	
		Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual
1	Present Method Estimate	5,806	0.78	4,850	0.81
	Select & Ultimate Estimate	5,803	0.78	5,000	0.83
	Actual	7,448	1.00	6,014	1.00
2	Present Method Estimate	5,907	0.80	4,833	0.78
	Select & Ultimate Estimate	6,092	0.80	4,836	0.78
	Actual	7,417	1.00	6,165	1.00
3	Present Method Estimate	5,835	0.76	4,870	0.77
	Select & Ultimate Estimate	6,106	0.80	5,010	0.80
	Actual	7,656	1.00	6,300	1.00
4	Present Method Estimate	5,853	0.80	4,827	0.73
	Select & Ultimate Estimate	5,898	0.81	5,091	0.77
	Actual	7,283	1.00	6,582	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	5,965	0.98	4,689	1.06
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,787	1.59	4,779	1.66
	Select & Ultimate Estimate	5,574	1.53	4,455	1.55
	Actual	3,639	1.00	2,880	1.00
7	Present Method Estimate	5,745	1.45	4,706	1.61
	Select & Ultimate Estimate	5,579	1.41	4,627	1.58
	Actual	3,963	1.00	2,927	1.00
8	Present Method Estimate	5,766	1.86	4,796	1.66
	Select & Ultimate Estimate	5,421	1.75	4,799	1.66
	Actual	3,106	1.00	2,890	1.00
9	Present Method Estimate	5,765	1.52	4,777	1.25
	Select & Ultimate Estimate	5,681	1.50	4,560	1.19
	Actual	3,797	1.00	3,827	1.00
Average	Present Method Estimate	5,809	1.04	4,799	1.03
	Select & Ultimate Estimate	5,791	1.03	4,785	1.03
	Actual	5,599	1.00	4,666	1.00
Mean Squared Error	Present Method Estimate		0.193		0.168
	Select & Ultimate Estimate		0.157		0.142
	Actual		0.000		0.000

Table 4-D1: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
 \*\* Enrollees

Part A	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
85+	3,983	4,607	3,512	4,074		1.54	1.78	1.36	1.57	
80-84	3,930	3,865	3,726	3,146		1.52	1.49	1.44	1.21	
75-79	3,727	3,109	3,390	2,481		1.44	1.20	1.31	0.96	
70-74	3,329	2,417	3,104	1,835		1.28	0.93	1.20	0.71	
65-69	3,133	1,780	2,864	1,399		1.21	0.69	1.11	0.54	
					2,591					1.00
60-64	3,771	2,764	4,081	3,250		1.48	1.08	1.60	1.28	
55-59	3,455	2,658	3,347	2,773		1.36	1.04	1.31	1.09	
45-54	2,788	1,927	3,095	2,276		1.09	0.76	1.21	0.89	
35-44	2,281	1,995	2,369	1,896		0.90	0.78	0.93	0.74	
<35	2,666	1,962	2,626	1,607		1.05	0.77	1.03	0.63	
					2,548					1.00
Part B										
85+	1,961	1,797	1,842	1,492		1.42	1.30	1.33	1.08	
80-84	1,974	1,820	1,834	1,462		1.43	1.31	1.32	1.06	
75-79	2,077	1,685	1,856	1,382		1.50	1.22	1.34	1.00	
70-74	1,987	1,404	1,808	1,181		1.43	1.01	1.31	0.85	
65-69	1,799	1,090	1,832	985		1.30	0.79	1.32	0.71	
					1,385					1.00
60-64	1,933	1,386	2,341	1,783		1.27	0.91	1.54	1.17	
55-59	1,933	1,419	1,909	1,586		1.27	0.93	1.26	1.04	
45-54	1,679	1,278	2,298	1,596		1.11	0.84	1.51	1.05	
35-44	1,607	1,179	1,772	1,194		1.06	0.78	1.17	0.79	
<35	1,421	884	1,877	1,025		0.94	0.58	1.24	0.68	
					1,518					1.00

Table 4-D2: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (299I ESRD)  
Persons with payments > \$10,000 in 1992

	MALE		FEMALE		MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
Part A									
85+	8,186	11,159	7,821	9,886	3.16	4.31	3.02	3.82	
80-84	9,117	10,338	8,244	9,614	3.52	3.99	3.18	3.71	
75-79	7,604	8,669	8,999	9,048	2.93	3.35	3.47	3.49	
70-74	9,090	7,888	9,691	8,655	3.51	3.04	3.74	3.34	
65-69	9,551	7,794	8,769	9,364	3.69	3.01	3.38	3.61	
					9,039				3.49
60-64	9,019	12,059	13,782	15,837	3.54	4.73	5.41	6.22	
55-59	14,115	11,335	12,078	14,345	5.54	4.45	4.74	5.63	
45-54	11,628	9,987	10,871	13,706	4.56	3.92	4.27	5.38	
35-44	10,690	12,540	7,170	12,440	4.20	4.92	2.81	4.88	
<35	13,801	8,990	12,893	14,180	5.42	3.53	5.06	5.57	
					11,973				4.70
Part B									
85+	4,196	3,804	3,671	3,047	3.03	2.75	2.65	2.20	
80-84	4,254	3,997	3,487	3,419	3.07	2.89	2.52	2.47	
75-79	4,909	4,221	4,079	3,772	3.54	3.05	2.95	2.72	
70-74	5,531	4,065	5,079	3,884	3.99	2.94	3.67	2.80	
65-69	5,740	4,137	5,782	4,446	4.15	2.99	4.17	3.21	
					3,932				2.84
60-64	6,511	6,263	6,635	7,220	4.29	4.12	4.37	4.76	
55-59	7,569	7,835	5,544	7,881	4.98	5.16	3.65	5.19	
45-54	5,999	7,884	7,979	9,963	3.95	5.19	5.26	6.56	
35-44	7,265	8,409	6,624	7,243	4.79	5.54	4.36	4.77	
<35	6,975	6,292	9,330	8,690	4.59	4.14	6.14	5.72	
					7,371				4.85

**Table 4-D3: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with Reimbursement > \$10,000 in 1994 but not in 1992**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>										
85+	4,477	5,548	3,723	5,706		1.73	2.14	1.44	2.20	
80-84	4,303	5,743	3,691	4,622		1.66	2.22	1.42	1.78	
75-79	6,622	4,477	4,501	4,662		2.56	1.73	1.74	1.80	
70-74	6,271	3,851	4,731	3,983		2.42	1.49	1.83	1.54	
65-69	4,349	3,615	3,163	4,042		1.68	1.40	1.22	1.56	
					4,544					1.75
60-64	5,199	5,124	3,659	6,475		2.04	2.01	1.44	2.54	
55-59	1,171	3,316	9,362	10,859		0.46	1.30	3.67	4.26	
45-54	2,807	2,740	9,602	3,362		1.10	1.08	3.77	1.32	
35-44	3,183	4,380	4,474	3,744		1.25	1.72	1.76	1.47	
<35	5,162	7,707	7,436	11,249		2.03	3.02	2.92	4.41	
					5,123					2.01
<b>Part B</b>										
85+	2,131	2,406	2,199	2,073		1.54	1.74	1.59	1.50	
80-84	2,265	2,523	2,509	2,158		1.64	1.82	1.81	1.56	
75-79	2,784	2,333	2,552	2,230		2.01	1.68	1.84	1.61	
70-74	3,475	2,201	2,603	2,135		2.51	1.59	1.88	1.54	
65-69	2,127	2,135	2,691	2,139		1.54	1.54	1.94	1.54	
					2,252					1.63
60-64	2,220	2,122	2,270	2,955		1.46	1.40	1.49	1.95	
55-59	1,560	2,172	3,101	3,973		1.03	1.43	2.04	2.62	
45-54	2,381	1,846	3,578	1,773		1.57	1.22	2.36	1.17	
35-44	1,887	1,925	2,553	1,854		1.24	1.27	1.68	1.22	
<35	1,836	2,038	3,619	2,117		1.21	1.34	2.38	1.39	
					2,341					1.54

**Table 4-D4: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with > \$10,000 Reimbursement in 1990, but not in 1991 or 1992**

	MALE		FEMALE		MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>									
85+	2,833	5,712	3,368	3,943	1.09	2.20	1.30	1.52	
80-84	2,679	3,543	5,598	4,756	1.03	1.37	2.16	1.84	
75-79	4,526	3,913	4,870	3,582	1.75	1.51	1.88	1.38	
70-74	2,268	3,851	4,452	3,375	0.88	1.49	1.72	1.30	
65-69	3,645	3,428	2,469	4,893	1.41	1.32	0.95	1.89	
					3,940				1.54
60-64	6,767	4,594	1,627	5,325	2.66	1.80	0.64	2.09	
55-59	3,531	6,562	6,840	3,855	1.39	2.58	2.68	1.51	
45-54	2,627	3,008	4,803	925	1.03	1.18	1.89	0.36	
35-44	4,385	2,601	3,019	10,126	1.72	1.02	1.18	3.97	
<35	5,525	4,378	3,277	1,325	2.17	1.72	1.29	0.52	
					4,239				1.66
<b>Part B</b>									
85+	1,838	2,249	2,065	1,629	1.33	1.62	1.49	1.18	
80-84	1,905	1,896	2,243	1,908	1.38	1.37	1.62	1.38	
75-79	2,518	2,003	2,602	1,912	1.82	1.45	1.88	1.38	
70-74	2,003	2,041	2,383	1,939	1.45	1.47	1.72	1.40	
65-69	1,575	1,759	1,960	2,105	1.14	1.27	1.42	1.52	
					1,949				1.41
60-64	2,829	1,749	2,224	2,440	1.86	1.15	1.46	1.61	
55-59	2,628	1,993	2,992	3,292	1.73	1.31	1.97	2.17	
45-54	2,553	1,680	2,068	1,390	1.68	1.11	1.36	0.92	
35-44	1,658	2,040	1,863	2,567	1.09	1.34	1.23	1.69	
<35	3,049	2,385	2,561	1,174	2.01	1.57	1.69	0.77	
					2,145				1.41

**Table 4-D5: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD) sons with No Reimbursement over \$10,000 in past 3 years**

Part A	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
85+	3,091	3,501	2,668	3,098		1.19	1.35	1.03	1.20	
80-84	2,908	2,843	2,664	2,246		1.12	1.10	1.03	0.87	
75-79	2,817	2,310	2,144	1,725		1.09	0.89	0.83	0.67	
70-74	2,304	1,766	1,909	1,247		0.89	0.68	0.74	0.48	
65-69	2,313	1,385	2,213	1,004		0.89	0.53	0.85	0.39	
					1,842					0.71
60-64	2,748	1,816	2,560	1,966		1.08	0.71	1.00	0.77	
55-59	1,870	1,839	1,694	1,535		0.73	0.72	0.66	0.60	
45-54	1,611	1,279	1,605	1,450		0.63	0.50	0.63	0.57	
35-44	1,218	1,115	1,648	909		0.48	0.44	0.65	0.36	
<35	1,474	1,307	1,445	856		0.58	0.51	0.57	0.34	
					1,536					0.60
Part B										
85+	1,466	1,425	1,431	1,209		1.06	1.03	1.03	0.87	
80-84	1,483	1,461	1,395	1,176		1.07	1.05	1.01	0.85	
75-79	1,538	1,321	1,331	1,100		1.11	0.95	0.96	0.79	
70-74	1,339	1,084	1,221	940		0.97	0.78	0.88	0.68	
65-69	1,327	889	1,359	816		0.96	0.64	0.98	0.59	
					1,083					0.78
60-64	1,185	923	1,621	1,240		0.78	0.61	1.07	0.82	
55-59	1,030	853	1,307	953		0.68	0.56	0.86	0.63	
45-54	1,052	760	1,440	997		0.69	0.50	0.95	0.66	
35-44	934	586	1,137	704		0.61	0.39	0.75	0.46	
<35	848	470	1,089	649		0.56	0.31	0.72	0.43	
					927					0.61

**Table 4-DU1: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Randomly Assigned Enrollees

Select and Ultimate AAPCC Based on Time Since Last Expense > \$10,000 Index  
Los Angeles

Chicago

Group Plan		Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual
1	Present Method Estimate	5,760	1.03	4,817	1.05
	Select & Ultimate Estimate	5,698	1.02	4,924	1.07
	Actual	5,566	1.00	4,583	1.00
2	Present Method Estimate	5,854	1.21	4,787	1.11
	Select & Ultimate Estimate	5,602	1.16	4,819	1.11
	Actual	4,850	1.00	4,327	1.00
3	Present Method Estimate	5,775	1.04	4,835	0.97
	Select & Ultimate Estimate	5,920	1.07	4,760	0.96
	Actual	5,527	1.00	4,975	1.00
4	Present Method Estimate	5,851	1.08	4,795	0.88
	Select & Ultimate Estimate	5,810	1.07	4,959	0.91
	Actual	5,421	1.00	5,459	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	5,976	0.98	4,648	1.06
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,838	0.97	4,819	1.04
	Select & Ultimate Estimate	5,620	0.93	4,629	1.00
	Actual	6,036	1.00	4,629	1.00
7	Present Method Estimate	5,822	0.83	4,764	0.94
	Select & Ultimate Estimate	6,138	0.87	4,923	0.97
	Actual	7,050	1.00	5,082	1.00
8	Present Method Estimate	5,834	1.01	4,838	1.07
	Select & Ultimate Estimate	5,643	0.97	4,865	1.08
	Actual	5,793	1.00	4,517	1.00
9	Present Method Estimate	5,776	0.96	4,815	0.92
	Select & Ultimate Estimate	5,926	0.98	4,690	0.89
	Actual	6,031	1.00	5,247	1.00
Average	Present Method Estimate	5,814	1.00	4,802	1.00
	Select & Ultimate Estimate	5,815	1.00	4,802	1.00
	Actual	5,818	1.00	4,803	1.00
Mean Squared Error	Present Method Estimate		0.010		0.006
	Select & Ultimate Estimate		0.006		0.006
	Actual		0.000		0.000



**Table 4-DU2: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Plans 6-9 pass patients with > \$10,000 in any of 1990-3 to plans 1-4  
 Select and Ultimate AAPCC Based on Time Since Last Expense > \$10,000 Index  
 Los Angeles

Chicago

Group Plan		Pre Capita Annual Cost	Fatio to Actual	Pre Capita Annual Cost	Ratio to Actual
1	Present Method Estimate	5,837	0.81	4,894	0.87
	Select & Ultimate Estimate	6,794	0.94	5,819	1.03
	Actual	7,209	1.00	5,637	1.00
2	Present Method Estimate	5,919	0.80	4,839	0.93
	Select & Ultimate Estimate	7,130	0.97	5,979	1.15
	Actual	7,370	1.00	5,188	1.00
3	Present Method Estimate	5,921	0.81	4,898	0.81
	Select & Ultimate Estimate	7,072	0.97	5,868	0.98
	Actual	7,292	1.00	6,015	1.00
4	Present Method Estimate	5,922	0.86	4,870	0.72
	Select & Ultimate Estimate	7,173	1.04	5,922	0.88
	Actual	6,911	1.00	6,741	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	5,976	0.98	4,648	1.06
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,738	1.58	4,711	1.50
	Select & Ultimate Estimate	3,932	1.08	3,307	1.05
	Actual	3,638	1.00	3,147	1.00
7	Present Method Estimate	5,711	1.54	4,683	1.17
	Select & Ultimate Estimate	3,906	1.05	3,255	0.81
	Actual	3,719	1.00	4,000	1.00
8	Present Method Estimate	5,633	1.73	4,750	1.61
	Select & Ultimate Estimate	3,887	1.19	3,321	1.12
	Actual	3,261	1.00	2,955	1.00
9	Present Method Estimate	5,648	1.44	4,712	1.39
	Select & Ultimate Estimate	3,872	0.99	3,268	0.97
	Actual	3,913	1.00	3,383	1.00
Average	Present Method Estimate	5,794	1.06	4,790	1.04
	Select & Ultimate Estimate	5,527	1.01	4,599	1.00
	Actual	5,489	1.00	4,608	1.00
Mean Squared Error	Present Method Estimate		0.164		0.104
	Select & Ultimate Estimate		0.006		0.011
	Actual		0.000		0.000

**Table 4-DU3: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Plans 6-9 pass half of patients with > \$10,000 in 1993 to plans 1-4, presently  
 Select and Ultimate AAPCC Based on Time Since Last Expense > \$10,000 Index  
 Los Angeles

			Chicago	
Group Plan	Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual
1	Present Method Estimate	5,797	4,833	0.81
	Select & Ultimate Estimate	5,834	5,064	0.85
	Actual	7,442	5,968	1.00
2	Present Method Estimate	5,883	4,818	0.79
	Select & Ultimate Estimate	6,039	4,936	0.81
	Actual	7,410	6,111	1.00
3	Present Method Estimate	5,808	4,866	0.78
	Select & Ultimate Estimate	6,219	4,899	0.78
	Actual	7,666	6,258	1.00
4	Present Method Estimate	5,853	4,801	0.73
	Select & Ultimate Estimate	6,019	5,104	0.78
	Actual	7,288	6,556	1.00
5	Present Method Estimate	5,822	4,751	1.08
	Select & Ultimate Estimate	5,976	4,648	1.06
	Actual	6,086	4,405	1.00
6	Present Method Estimate	5,798	4,800	1.58
	Select & Ultimate Estimate	5,446	4,450	1.47
	Actual	3,761	3,038	1.00
7	Present Method Estimate	5,782	4,727	1.52
	Select & Ultimate Estimate	5,658	4,797	1.55
	Actual	4,147	3,102	1.00
8	Present Method Estimate	5,800	4,804	1.57
	Select & Ultimate Estimate	5,276	4,717	1.54
	Actual	3,329	3,059	1.00
9	Present Method Estimate	5,768	4,809	1.20
	Select & Ultimate Estimate	5,694	4,513	1.13
	Actual	3,928	3,998	1.00
Average	Present Method Estimate	5,812	4,801	1.02
	Select & Ultimate Estimate	5,796	4,792	1.01
	Actual	5,673	4,722	1.00
Mean Squared Error	Present Method Estimate		0.157	0.132
	Select & Ultimate Estimate		0.114	0.109
	Actual		0.000	0.000

**Table 4-E1: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
All Enrollees**

	MALE		FEMALE		MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>									
85+	3,983	4,607	3,512	4,074	1.54	1.78	1.36	1.57	
80-84	3,930	3,865	3,726	3,146	1.52	1.49	1.44	1.21	
75-79	3,727	3,109	3,390	2,481	1.44	1.20	1.31	0.96	
70-74	3,329	2,417	3,104	1,835	1.28	0.93	1.20	0.71	
65-69	3,133	1,780	2,864	1,399	1.21	0.69	1.11	0.54	
					2,591				1.00
60-64	3,771	2,764	4,081	3,250	1.48	1.08	1.60	1.28	
55-59	3,455	2,658	3,347	2,773	1.36	1.04	1.31	1.09	
45-54	2,788	1,927	3,095	2,276	1.09	0.76	1.21	0.89	
35-44	2,281	1,995	2,369	1,896	0.90	0.78	0.93	0.74	
<35	2,666	1,962	2,626	1,607	1.05	0.77	1.03	0.63	
					2,548				1.00
<b>Part B</b>									
85+	1,961	1,797	1,842	1,492	1.42	1.30	1.33	1.08	
80-84	1,974	1,820	1,834	1,462	1.43	1.31	1.32	1.06	
75-79	2,077	1,685	1,856	1,382	1.50	1.22	1.34	1.00	
70-74	1,987	1,404	1,808	1,181	1.43	1.01	1.31	0.85	
65-69	1,799	1,090	1,832	985	1.30	0.79	1.32	0.71	
					1,385				1.00
60-64	1,933	1,386	2,341	1,783	1.27	0.91	1.54	1.17	
55-59	1,933	1,419	1,909	1,586	1.27	0.93	1.26	1.04	
45-54	1,679	1,278	2,298	1,596	1.11	0.84	1.51	1.05	
35-44	1,607	1,179	1,772	1,194	1.06	0.78	1.17	0.79	
<35	1,421	884	1,877	1,025	0.94	0.58	1.24	0.68	
					1,518				1.00

**Table 4-E2: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (299i ESRD)  
Persons with No Reimbursement in 1992, but some in 1991**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>										
85+	1,058	2,971	2,504	2,492		0.41	1.15	0.97	0.96	
80-84	2,417	2,603	2,360	1,619		0.93	1.00	0.91	0.62	
75-79	871	1,552	1,176	989		0.34	0.60	0.45	0.38	
70-74	946	1,189	2,335	818		0.37	0.46	0.90	0.32	
65-69	1,382	923	1,007	741		0.53	0.36	0.39	0.29	
					1,327					0.51
60-64	733	865	209	807		0.29	0.34	0.08	0.32	
55-59	597	526	2,067	103		0.23	0.21	0.81	0.04	
45-54	226	380	1,478	1,820		0.09	0.15	0.58	0.71	
35-44	893	309	292	33		0.35	0.12	0.11	0.01	
<35	560	62	1,817	292		0.22	0.02	0.71	0.11	
					618					0.24
<b>Part B</b>										
85+	727	829	807	638		0.52	0.60	0.58	0.46	
80-84	1,112	904	677	602		0.80	0.65	0.49	0.43	
75-79	723	711	542	533		0.52	0.51	0.39	0.38	
70-74	1,399	610	825	468		1.01	0.44	0.60	0.34	
65-69	822	515	710	413		0.59	0.37	0.51	0.30	
					590					0.43
60-64	400	392	143	693		0.26	0.26	0.09	0.46	
55-59	316	282	813	164		0.21	0.19	0.54	0.11	
45-54	201	232	477	314		0.13	0.15	0.31	0.21	
35-44	509	193	200	186		0.34	0.13	0.13	0.12	
<35	226	106	506	87		0.15	0.07	0.33	0.06	
					299					0.20

**Table 4-E3: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with No Reimbursement in 1991 or 1992 but Some in 1990**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
Part A										
85+	5,529	1,743	2,876	2,320		2.13	0.67	1.11	0.90	
80-84	1,265	1,677	2,012	1,640		0.49	0.65	0.78	0.63	
75-79	4,271	1,172	628	707		1.65	0.45	0.24	0.27	
70-74	1,352	864	1,122	664		0.52	0.33	0.43	0.26	
65-69	1,545	1,057	431	625		0.60	0.41	0.17	0.24	
					1,139					0.44
60-64	1,000	473	0	2,481		0.39	0.19	0.00	0.97	
55-59	2,736	629	0	215		1.07	0.25	0.00	0.08	
45-54	263	757	634	408		0.10	0.30	0.25	0.16	
35-44	838	346	0	231		0.33	0.14	0.00	0.09	
<35	2,229	252	560	0		0.87	0.10	0.22	0.00	
					676					0.27
Part B										
85+	1,159	682	903	621		0.84	0.49	0.65	0.45	
80-84	342	553	715	475		0.25	0.40	0.52	0.34	
75-79	1,716	598	439	377		1.24	0.43	0.32	0.27	
70-74	757	440	411	328		0.55	0.32	0.30	0.24	
65-69	207	584	402	381		0.15	0.42	0.29	0.27	
					481					0.35
60-64	167	183	90	371		0.11	0.12	0.06	0.24	
55-59	476	435	11	65		0.31	0.29	0.01	0.04	
45-54	638	323	626	159		0.42	0.21	0.41	0.10	
35-44	241	114	181	190		0.16	0.07	0.12	0.12	
<35	795	87	149	37		0.52	0.06	0.10	0.02	
					268					0.18

**Table 4-E4: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with No Reimbursement in 1990, 1991, or 1992**

	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
<b>Part A</b>										
85+	3,202	1,297	1,671	1,415		1.24	0.50	0.65	0.55	
80-84	1,220	1,696	2,132	1,107		0.47	0.65	0.82	0.43	
75-79	1,177	1,149	1,580	806		0.45	0.44	0.61	0.31	
70-74	1,358	1,212	851	751		0.52	0.47	0.33	0.29	
65-69	1,615	959	1,938	736		0.62	0.37	0.75	0.28	
					983					0.38
60-64	3,730	1,316	2,897	1,440		1.46	0.52	1.14	0.57	
55-59	1,323	1,786	2,031	1,032		0.52	0.70	0.80	0.41	
45-54	1,855	975	1,750	1,047		0.73	0.38	0.69	0.41	
35-44	1,266	836	1,448	730		0.50	0.33	0.57	0.29	
<35	1,313	942	1,137	436		0.52	0.37	0.45	0.17	
					1,223					0.48
<b>Part B</b>										
85+	1,211	359	610	334		0.87	0.26	0.44	0.24	
80-84	354	543	735	373		0.26	0.39	0.53	0.27	
75-79	534	443	744	346		0.39	0.32	0.54	0.25	
70-74	570	401	389	304		0.41	0.29	0.28	0.22	
65-69	917	562	1,070	522		0.66	0.41	0.77	0.38	
					493					0.36
60-64	953	528	1,596	748		0.63	0.35	1.05	0.49	
55-59	673	598	951	558		0.44	0.39	0.63	0.37	
45-54	861	419	1,412	674		0.57	0.28	0.93	0.44	
35-44	586	296	738	432		0.39	0.19	0.49	0.28	
<35	630	241	842	355		0.42	0.16	0.55	0.23	
					553					0.37

**Table 4-E5: Cost Per Capita and Relative Rates, 1993: Excludes Status 31 (2991 ESRD)  
Persons with Reimbursement in 1992**

Part A	MALE		FEMALE			MALE		FEMALE		
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid		Medicaid	Non-Medicaid	Medicaid	Non-Medicaid	
85+	4,164	5,119	3,595	4,391		1.61	1.98	1.39	1.69	
80-84	4,288	4,174	3,863	3,393		1.65	1.61	1.49	1.31	
75-79	4,139	3,490	3,617	2,742		1.60	1.35	1.40	1.06	
70-74	3,917	2,798	3,315	2,063		1.51	1.08	1.28	0.80	
65-69	3,912	2,372	3,216	1,768		1.51	0.92	1.24	0.68	
					3,009					1.16
60-64	4,052	3,718	4,378	4,011		1.59	1.46	1.72	1.57	
55-59	4,023	3,534	3,614	3,787		1.58	1.39	1.42	1.49	
45-54	3,179	2,774	3,449	2,855		1.25	1.09	1.35	1.12	
35-44	2,727	3,101	2,706	2,750		1.07	1.22	1.06	1.08	
<35	3,440	3,533	3,211	3,022		1.35	1.39	1.26	1.19	
					3,346					1.31
Part B										
85+	2,089	2,032	1,914	1,642		1.51	1.47	1.38	1.19	
80-84	2,187	2,013	1,936	1,602		1.58	1.45	1.40	1.16	
75-79	2,326	1,920	1,989	1,536		1.68	1.39	1.44	1.11	
70-74	2,299	1,683	1,967	1,353		1.66	1.21	1.42	0.98	
65-69	2,263	1,475	2,098	1,251		1.63	1.06	1.51	0.90	
					1,625					1.17
60-64	2,286	1,932	2,521	2,224		1.51	1.27	1.66	1.47	
55-59	2,289	2,082	2,103	2,175		1.51	1.37	1.39	1.43	
45-54	1,942	1,986	2,559	2,109		1.28	1.31	1.69	1.39	
35-44	2,028	1,963	2,082	1,727		1.34	1.29	1.37	1.14	
<35	1,883	1,785	2,337	1,854		1.24	1.18	1.54	1.22	
					2,076					1.37

**Table 4-EU1: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Randomly Assigned Enrollees

Select and Ultimate AAPCC Based on Time Since Last Positive Expense Index  
Los Angeles

		Chicago			
Group Plan	Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual	
1	Present Method Estimate	5,760	1.03	4,817	1.05
	Select & Ultimate Estimate	5,798	1.04	4,807	1.05
	Actual	5,566	1.00	4,583	1.00
2	Present Method Estimate	5,854	1.21	4,787	1.11
	Select & Ultimate Estimate	5,884	1.21	4,760	1.10
	Actual	4,850	1.00	4,327	1.00
3	Present Method Estimate	5,775	1.04	4,835	0.97
	Select & Ultimate Estimate	5,736	1.04	4,866	0.98
	Actual	5,527	1.00	4,975	1.00
4	Present Method Estimate	5,851	1.08	4,795	0.88
	Select & Ultimate Estimate	5,859	1.08	4,857	0.89
	Actual	5,421	1.00	5,459	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	5,768	0.95	4,856	1.10
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,838	0.97	4,819	1.04
	Select & Ultimate Estimate	5,847	0.97	4,760	1.03
	Actual	6,036	1.00	4,629	1.00
7	Present Method Estimate	5,822	0.83	4,764	0.94
	Select & Ultimate Estimate	5,925	0.84	4,741	0.93
	Actual	7,050	1.00	5,082	1.00
8	Present Method Estimate	5,834	1.01	4,838	1.07
	Select & Ultimate Estimate	5,705	0.98	4,837	1.07
	Actual	5,793	1.00	4,517	1.00
9	Present Method Estimate	5,776	0.96	4,815	0.92
	Select & Ultimate Estimate	5,807	0.96	4,730	0.90
	Actual	6,031	1.00	5,247	1.00
Average	Present Method Estimate	5,814	1.00	4,802	1.00
	Select & Ultimate Estimate	5,814	1.00	4,802	1.00
	Actual	5,818	1.00	4,803	1.00
Mean Squared Error	Present Method Estimate		0.010		0.006
	Select & Ultimate Estimate		0.010		0.006
	Actual		0.000		0.000



**Table 4-EU2: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Plans 6-9 p... half of patients with > \$5,000 in 1991 to plans 1-4  
 Select and Ultimate AAPCC Based on Time Since Last Positive Expense Index  
 Los Angeles

Group Plan	Los Angeles		Chicago		
	Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual	
1 Present Method Estimate	5,881	0.93	4,906	0.97	
	Select & Ultimate Estimate	6,179	0.97	5,208	1.03
	Actual	6,345	1.00	5,033	1.00
2 Present Method Estimate	5,935	0.91	4,881	0.95	
	Select & Ultimate Estimate	6,253	0.96	5,182	1.01
	Actual	6,527	1.00	5,156	1.00
3 Present Method Estimate	5,905	0.94	4,953	0.96	
	Select & Ultimate Estimate	6,131	0.98	5,275	1.02
	Actual	6,286	1.00	5,149	1.00
4 Present Method Estimate	5,912	0.94	4,868	0.83	
	Select & Ultimate Estimate	6,236	0.99	5,206	0.89
	Actual	6,295	1.00	5,879	1.00
5 Present Method Estimate	5,822	0.96	4,751	1.08	
	Select & Ultimate Estimate	5,768	0.95	4,856	1.10
	Actual	6,086	1.00	4,405	1.00
6 Present Method Estimate	5,264	2.32	4,371	1.80	
	Select & Ultimate Estimate	3,529	1.56	2,626	1.08
	Actual	2,267	1.00	2,431	1.00
7 Present Method Estimate	5,212	2.39	4,239	1.75	
	Select & Ultimate Estimate	3,674	1.68	2,563	1.06
	Actual	2,184	1.00	2,416	1.00
8 Present Method Estimate	5,241	2.42	4,279	1.51	
	Select & Ultimate Estimate	3,434	1.59	2,832	1.00
	Actual	2,163	1.00	2,825	1.00
9 Present Method Estimate	5,219	2.28	4,484	1.67	
	Select & Ultimate Estimate	3,398	1.49	2,699	1.00
	Actual	2,287	1.00	2,687	1.00
Average	Present Method Estimate	5,599	1.25	4,637	1.16
	Select & Ultimate Estimate	4,956	1.10	4,050	1.01
	Actual	4,493	1.00	3,998	1.00
Mean Squared Error	Present Method Estimate		0.818		0.218
	Select & Ultimate Estimate		0.151		0.004
	Actual		0.000		0.000

**Table 4-EU3: Comparison of Present AAPCC with Select and Ultimate AAPCC, 1993**

Plans 6-9 pass half of patients with > \$5,000 in 1993 to plans 1-4, presently  
 Select and Ultimate AAPCC Based on Time Since Last Positive Expense Index  
 Los Angeles

		Chicago			
Group Plan	Pre Capita Annual Cost	Ratio to Actual	Pre Capita Annual Cost	Ratio to Actual	
1	Present Method Estimate	5,806	0.78	4,850	0.81
	Select & Ultimate Estimate	5,890	0.79	4,886	0.81
	Actual	7,448	1.00	6,014	1.00
2	Present Method Estimate	5,907	0.80	4,833	0.78
	Select & Ultimate Estimate	6,008	0.81	4,856	0.79
	Actual	7,417	1.00	6,165	1.00
3	Present Method Estimate	5,835	0.76	4,870	0.77
	Select & Ultimate Estimate	5,859	0.77	4,953	0.79
	Actual	7,656	1.00	6,300	1.00
4	Present Method Estimate	5,853	0.80	4,827	0.73
	Select & Ultimate Estimate	5,935	0.81	4,918	0.75
	Actual	7,283	1.00	6,582	1.00
5	Present Method Estimate	5,822	0.96	4,751	1.08
	Select & Ultimate Estimate	5,768	0.95	4,856	1.10
	Actual	6,086	1.00	4,405	1.00
6	Present Method Estimate	5,787	1.59	4,779	1.66
	Select & Ultimate Estimate	5,732	1.58	4,659	1.62
	Actual	3,639	1.00	2,880	1.00
7	Present Method Estimate	5,745	1.45	4,706	1.61
	Select & Ultimate Estimate	5,765	1.45	4,622	1.58
	Actual	3,963	1.00	2,927	1.00
8	Present Method Estimate	5,766	1.86	4,796	1.66
	Select & Ultimate Estimate	5,543	1.78	4,731	1.64
	Actual	3,106	1.00	2,890	1.00
9	Present Method Estimate	5,765	1.52	4,777	1.25
	Select & Ultimate Estimate	5,706	1.50	4,640	1.21
	Actual	3,797	1.00	3,827	1.00
Average	Present Method Estimate	5,809	1.04	4,799	1.03
	Select & Ultimate Estimate	5,801	1.04	4,791	1.03
	Actual	5,599	1.00	4,666	1.00
Mean Squared Error	Present Method Estimate		0.193		0.168
	Select & Ultimate Estimate		0.175		0.152
	Actual		0.000		0.000

## Chapter :

### Reinsurance with Medicare as Reinsurer

The next technique to be examined is reinsurance with the Medicare program serving as the reinsurer. The basic concept is that HCFA would provide reinsurance coverage to HMOs and CMPs that are participating in the Medicare risk program. The cost of the reinsurance would be expressed as a percentage of the AAPCC. For example, a substantial amount of reinsurance could be provided by HCFA in exchange for a 10 percent to 25 percent reduction in the AAPCC payments to participating plans. Alternatively, a minor amount of reinsurance (one percent to three percent of the AAPCC) could be provided as additional payments by HCFA as an incentive to join or stay in the risk program.

Reinsurance is another method of risk-sharing with participating health plans. One approach is to provide individual stop-loss reinsurance with the Medicare program acting as the reinsurer. Medicare would pay all or part of the medical expenses above a specified limit (threshold) out of a reinsurance pool. The reinsurance would apply to all claims incurred by an individual Medicare enrollee in a calendar year, or to a subset of the incurred claims (e.g., inpatient hospital claims only). The reinsurance pool would be funded by reducing the capitation amount paid for each HMO enrollee. For enrollees with expenses below the predefined limit, the HMO would receive a lower capitation amount than under the AAPCC methodology. For enrollees with expenses above the limit, the HMO would receive the capitation amount plus some percentage of all expenses exceeding the limit. The percentage of expenses above the limit reimbursed by the Medicare program could be set at less than 100 percent to provide the HMO with some financial stake in managing its high-cost cases.

In this project, our evaluation of the practical use of reinsurance has focused on two demonstrations that are being established by HCFA: (1) the HMO Outlier Pool Demonstration, and (2) the Medicare Choices Demonstration. In

response to requests from HCFA, ARC prepared a working paper and a number of memoranda relating to the cost of reinsurance options for the two demonstrations. The major results of the reinsurance analyses are summarized in this chapter. The working paper for the EMO Outlier Pool Demonstration is contained in Appendix A. The primary memorandum for the Medicare Choices Demonstration is contained in Appendix B.

#### 5.1 HMO Outlier Pool Demonstration

HCFA is planning to test a reinsurance approach in the HMO Outlier Pool Demonstration. The major features of the demonstration were described in Chapter 2.

Four HMOs in the Seattle area have committed to participate in the demonstration. These plans will be paid at 95 percent of the AAPCC, with an additional two percent of the AAPCC paid into an outlier pool by HCFA. The participating plans will be allowed to make claims against the pool to pay for high-cost cases that exceed a predetermined threshold. The HMOs will be required to pay coinsurance on the amount above the threshold for each case. This approach appeals to the plans because it allows them to be paid more than 95 percent of the AAPCC for their enrollees. From the HCFA perspective, the demonstration permits a test of a payment methodology which could eliminate some of the incentives for risk HMOs to enroll healthier individuals present under the current payment system.

The HMO Outlier Pool Demonstration provides an opportunity to evaluate the impact of outlier pools, a modification of the AAPCC payment method for risk HMOs that involves retrospective risk adjustment. In the demonstration, four HMOs from the selected market area will utilize a pool of funds to pay for the costs of individual Medicare enrollees that exceed a specified threshold value of costs. The outlier pool will be funded by HCFA contributing two percent of the AAPCC into the pool. An HMO that experiences a higher than average incidence of high-cost cases with costs that exceed the pool threshold will receive more from the pool, on a per capita basis, than

the average HMO. In so far as the high costs are due to adverse selection of sicker beneficiaries (rather than due to other factors, e.g., poor case management), the outlier payments may partially compensate for biased selection among the participating plans. In this way, an outlier pool differs from reinsurance for individual plans because the goal of an outlier pool is to adjust for risk differences among plans in an area rather than providing an individual plan protection against catastrophic cases.

Although other methods for adjusting payments to Medicare HMOs to account for the effects of biased selection had been discussed in the Office of the Actuary in the 1970s, the concept of outlier payments for risk HMOs was first identified by Cookson in a report to HCFA in 1983.<sup>1</sup> James Beebe, formerly of HCFA's Office of Research, conducted further research on the topic as part of his investigation of alternative payment methods for risk HMOs.<sup>2</sup> In addition, retrospective approaches to risk adjustment, such as outlier payments or payments for high-cost conditions, have been proposed recently (as part of the Health Security Act and by the American Academy of Actuaries) because of the more limited data requirements needed for implementation and also because of the potential advantages of risk adjustment systems utilizing both prospective and retrospective methods.

During the period of planning for the outlier pool demonstration, ARC was asked to provide reinsurance tabulations that would provide assistance to both HCFA and the demonstration sites in setting up the demonstration. Key issues involved: (1) determining the reinsurance threshold that would be used to determine outlier payments, (2) setting the plan coinsurance level for the portion of the outlier payment that the plan would have to pay, and (3) estimating the cost to HCFA of the reinsurance coverage based on the threshold level and the plan coinsurance level. The results of our analysis were

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<sup>1</sup> John P. Cookson, Final Report - Review of AAPCC Methodology for Implementing Prospective Contracts with HMOs, prepared for the Health Care Financing Administration, contract number 500-38-0018, August 1983.

<sup>2</sup> James C. Beebe, "An Outlier Pool for Medicare HMO Payments," Health Care Financing Review 14(1):59, Fall 1992.

documented in a working paper that was distributed to each of potential health plan participants in the demonstration. The working paper on the reinsurance tabulations for the HMO Outlier Pool Demonstration is contained in Appendix A.

The results of the outlier pool analysis reflect the number and distribution of high-cost cases. Thus, the results are very sensitive to the type of data used to conduct the analysis. To evaluate the degree of sensitivity to different data sources and assumptions, three sets of data were used to estimate the level of expenditures based on the characteristics of the outlier pool: (1) a one percent national sample from the Continuous Medicare History Sample (CMHS) for 1985 - 1992, (2) local fee-for-service data for the three market areas (Minneapolis/St. Paul, Seattle, and Portland) based on a five percent sample from the CMHS for 1985 - 1992, and (3) data from an HMO with a Medicare risk contract for 1990 - 1992.

Continuance tables are the basic technique used in the analysis. A continuance table estimates the percentage of total expenditures that exceed specified thresholds by analyzing the distribution of health expenditures for all persons enrolled in the health plan in a year. Person-level expenditure data are used in the analysis to construct the continuance tables.

The continuance tables are developed from historical data. To apply the continuance table results to the first year of the demonstration (calendar year 1995), it was necessary to project the distribution of high-cost cases affected by the outlier pool from the historical period to 1995. This was accomplished by scaling the expenditure distribution using the relative per capita costs in the two periods.

#### Distribution of Medicare High-cost Cases

Table 5-1 summarizes the distribution of expenditures for high-cost cases in the Medicare population from 1985 to 1992. For each year, the national one percent sample was used to determine the dollar threshold for which specified percentages of total expenditures exceeded the threshold. For

Table 5-1

Threshold (\$000) at Which Annual Claims  
Exceed Percent of Total Expenditures

Percent	Year							
	1985	1986	1987	1988	1989	1990	1991	1992
50%	4	5	5	5	6	6	6	6
25%	10	11	12	13	15	14	15	16
20%	12	13	14	15	18	17	19	20
15%	15	16	17	19	22	21	23	25
10%	19	20	22	24	29	28	30	32
5%	26	28	30	34	42	40	43	47
4%	28	31	33	37	47	44	48	52
3%	32	35	37	42	55	51	55	59
2%	36	40	42	48	67	61	66	70
1%	44	48	52	61	93	80	86	92
Mean	\$1,994	\$2,094	\$2,260	\$2,394	\$2,671	\$2,791	\$3,014	\$3,255
% Increase	---	1.05	1.08	1.06	1.12	1.04	1.08	1.08

Source: Continuous Medicare History Sample, 1% sample for indicated years.

example, in 1985 10 percent of total expenditures exceeded a threshold of \$19,000 (i.e., if per person expenditures were truncated at \$19,000, the aggregate of all costs exceeding \$19,000 would correspond to 10 percent of total Medicare expenditures in 1985). By 1992, the threshold for the top 10 percent of expenditures had increased to \$32,000.

As shown in Table 5-1, the thresholds for high-cost cases are very sensitive to the growth in health care costs over time. From 1985 to 1992, the per capita annual Medicare expenditures rose 63 percent from \$1,994 to \$3,255, based on the CMHS one percent national sample. However, the threshold for the top one percent of Medicare expenditures rose from \$44,000 in 1985 to \$92,000 in 1992, an increase of 109 percent.

In general, with the exception of 1989, there was a consistent pattern of increases in the thresholds for the selected percentages of total expenditures in Table 5-1. The Medicare Catastrophic Coverage Act (MCCA) was effective for calendar year 1989 and was probably at least partially responsible for the aberrant cost behavior in that year. If the 1989 experience is excluded, then there appears to be a relatively smooth pattern in the thresholds from 1985 to 1992.

#### Expected Outlier Pool Expenditures in Selected Sites

For the 1995 Alternative Payment Demonstration, the continuance table results using the three sets of historical data (national CMHS one percent sample, local market area CMHS five percent sample, and HMO data) were projected to 1995 for each of the three potential demonstration sites of Minneapolis/St. Paul, Portland, and Seattle. As discussed above, a scaling technique was used to translate the continuance table for the historical period to calendar year 1995 for each demonstration site. A ratio of the relative per capita costs in the historical period to 1995 was used to scale the cost distributions. The 1995 per capita for each demonstration site was estimated using: (1) the 1994 AAPCC payment rates inflated by the projected AAPCC increases for 1995, and (2) the distribution of HMO enrollees by county



and demographic characteristics. Due to the relatively small sample sizes from the CMHS five percent sample for the local market areas (4,000 - 14,000 persons per year per market area), four years of historical data, 1989 - 1992, were combined to construct the local area continuance tables for Minneapolis/St. Paul, Portland, and Seattle.

Table 5-2 presents expected outlier pool expenditures in the three 1995 demonstration sites, assuming no HMO coinsurance (the impact of plan coinsurance is examined later). For each site, the results from the continuance tables are summarized for each of the different data sources. The first column of Table 5-2 identifies the thresholds. The next three columns are for Minneapolis/St. Paul and show the percentage of total expenditures that exceed the thresholds for each of the three different data sources. The last six columns of Table 5-2 present similar information for the Portland and Seattle sites. More detailed information for each site is presented in Appendix A.

As can be seen in Table 5-2, the results within each site are fairly similar, but there are differences both across sites and within sites. For example, for a threshold of \$50,000 at the Minneapolis/St. Paul site in 1995, the results for the national one percent sample data and the local fee-for-service (five percent sample) data are similar. The national and local data predict that 5.99 percent and 5.97 percent of total HMO expenditures in 1995 would exceed the threshold, whereas the HMO data predicts that only 4.77 percent of total expenditures would exceed a \$50,000 threshold.

For a \$50,000 threshold at the Portland site in 1995, the local data predict the highest outlier pool expenditures (6.43 percent), followed by the national data (6.09 percent) and the HMO data (4.85 percent). For Seattle in 1995, the national data are highest with 6.28 percent predicted outlier pool expenditures, followed by HMO data with 5.02 percent and the local five percent sample data with 4.22 percent.

Table 5-3 illustrates the type of detailed information that is contained in Appendix A. In addition to thresholds and percent of total expenditures

Table 5-2

Percentage of Total Expenditures that Exceed Selected Thresholds  
by Geographic Location

Threshold	<u>Minneapolis/St. Paul</u>			<u>Portland</u>			<u>Seattle</u>		
	<u>Natl FFS</u>	<u>Local FFS</u>	<u>HMO</u>	<u>Natl FFS</u>	<u>Local FFS</u>	<u>HMO</u>	<u>Natl FFS</u>	<u>Local FFS</u>	<u>HMO</u>
\$5,000	61.84%	63.34%	54.47%	62.04%	64.29%	54.66%	62.40%	61.48%	54.99%
\$10,000	44.04	44.76	37.85	44.28	46.70	38.07	44.70	43.49	38.47
\$15,000	32.55	32.48	27.45	32.80	35.05	27.66	33.24	31.54	28.05
\$20,000	24.53	24.11	20.55	24.76	26.52	20.75	25.18	23.04	21.10
\$25,000	18.81	18.27	15.74	19.02	20.33	15.91	19.40	17.18	16.23
\$30,000	14.64	14.05	12.17	14.83	15.79	12.33	15.17	12.89	12.61
\$35,000	11.52	10.96	9.54	11.69	12.41	9.68	11.98	9.69	9.93
\$40,000	9.17	8.74	7.52	9.32	9.85	7.64	9.57	7.31	7.87
\$45,000	7.37	7.18	5.96	7.49	7.89	6.06	7.72	5.53	6.26
\$50,000	5.99	5.97	4.77	6.09	6.43	4.85	6.28	4.22	5.02
\$55,000	4.92	5.02	3.86	5.01	5.31	3.94	5.17	3.26	4.08
\$60,000	4.08	4.31	3.17	4.16	4.48	3.24	4.30	2.55	3.35
\$65,000	3.43	3.73	2.62	3.50	3.87	2.68	3.62	2.03	2.78
\$70,000	2.92	3.24	2.18	2.98	3.38	2.23	3.08	1.66	2.32
\$75,000	2.51	2.84	1.82	2.55	2.98	1.86	2.64	1.36	1.94
\$80,000	2.16	2.52	1.52	2.21	2.63	1.56	2.29	1.13	1.63
\$85,000	1.87	2.25	1.27	1.91	2.34	1.30	1.98	0.95	1.37
\$90,000	1.63	1.99	1.05	1.67	2.11	1.08	1.73	0.79	1.14
\$95,000	1.43	1.78	0.87	1.46	1.88	0.89	1.52	0.67	0.94
\$100,000	1.27	1.60	0.72	1.29	1.68	0.74	1.34	0.57	0.78
\$105,000	1.12	1.44	0.62	1.14	1.47	0.64	1.19	0.48	0.67
\$110,000	0.99	1.30	0.52	1.01	1.29	0.54	1.05	0.41	0.57
\$115,000	0.88	1.17	0.45	0.90	1.14	0.46	0.94	0.35	0.49
\$120,000	0.79	1.06	0.39	0.80	1.02	0.40	0.84	0.30	0.42
\$125,000	0.70	0.96	0.33	0.72	0.91	0.34	0.75	0.25	0.36

Table 5-3

Example of Continuance Table with Impact of Plan Coinsurance

Year: 1995

Type of data: National (1990)

Population: All eligibles, excluding Medicaid and ESRD

Projection assumptions: Projected to Minneapolis/St. Paul

Projection factor: 1.4394

Threshold	% of Persons Exceeding Threshold	% of Dollars Exceeding Threshold	% of Total Expenditures in Outlier Pool Based on Level of Plan Coinsurance				
			30%	40%	50%	60%	70%
5000	0.17318	0.61839	0.43287	0.37103	0.30919	0.24735	0.18552
10000	0.10306	0.44038	0.30827	0.26423	0.22019	0.17615	0.13211
11000	0.09504	0.41383	0.28968	0.24830	0.20691	0.16553	0.12415
12000	0.08832	0.38928	0.27250	0.23357	0.19464	0.15571	0.11678
13000	0.08196	0.36647	0.25653	0.21988	0.18324	0.14659	0.10994
14000	0.07630	0.34528	0.24169	0.20717	0.17264	0.13811	0.10358
15000	0.07099	0.32552	0.22786	0.19531	0.16276	0.13021	0.09766
16000	0.06613	0.30713	0.21499	0.18428	0.15357	0.12285	0.09214
17000	0.06166	0.29000	0.20300	0.17400	0.14500	0.11600	0.08700
18000	0.05742	0.27404	0.19183	0.16442	0.13702	0.10962	0.08221
19000	0.05361	0.25918	0.18143	0.15551	0.12959	0.10367	0.07755
20000	0.05013	0.24528	0.17170	0.14717	0.12264	0.09811	0.07358
21000	0.04678	0.23229	0.16260	0.13937	0.11614	0.09291	0.06969
22000	0.04382	0.22014	0.15410	0.13208	0.11007	0.08806	0.06604
23000	0.04101	0.20876	0.14613	0.12526	0.10438	0.08350	0.06263
24000	0.03844	0.19810	0.13867	0.11886	0.09905	0.07924	0.05943
25000	0.03600	0.18812	0.13168	0.11287	0.09406	0.07525	0.05643
26000	0.03383	0.17876	0.12513	0.10726	0.08938	0.07150	0.05363
27000	0.03194	0.16994	0.11896	0.10196	0.08497	0.06798	0.05098
28000	0.03004	0.16163	0.11314	0.09698	0.08082	0.06465	0.04849
29000	0.02837	0.15381	0.10766	0.09228	0.07690	0.06152	0.04614
30000	0.02681	0.14640	0.10248	0.08784	0.07320	0.05856	0.04392
31000	0.02528	0.13943	0.09760	0.08366	0.06971	0.05577	0.04183
32000	0.02387	0.13284	0.09299	0.07971	0.06642	0.05314	0.03985
33000	0.02254	0.12663	0.08864	0.07598	0.06331	0.05065	0.03799
34000	0.02123	0.12076	0.08453	0.07246	0.06038	0.04831	0.03623
35000	0.02008	0.11522	0.08065	0.06913	0.05761	0.04609	0.03457
36000	0.01894	0.10999	0.07699	0.06599	0.05499	0.04400	0.03300
37000	0.01790	0.10505	0.07354	0.06303	0.05253	0.04202	0.03152
38000	0.01694	0.10038	0.07026	0.06023	0.05019	0.04015	0.03011
39000	0.01605	0.09595	0.06716	0.05757	0.04797	0.03838	0.02878
40000	0.01531	0.09174	0.06422	0.05504	0.04587	0.03670	0.02752
41000	0.01455	0.08774	0.06142	0.05264	0.04387	0.03509	0.02632
42000	0.01382	0.08393	0.05875	0.05036	0.04197	0.03357	0.02518
43000	0.01304	0.08032	0.05623	0.04819	0.04016	0.03213	0.02410
44000	0.01238	0.07692	0.05384	0.04615	0.03846	0.03077	0.02307
45000	0.01175	0.07368	0.05158	0.04421	0.03684	0.02947	0.02210
46000	0.01114	0.07061	0.04943	0.04237	0.03531	0.02825	0.02118
47000	0.01054	0.06771	0.04740	0.04063	0.03385	0.02708	0.02031
48000	0.01001	0.06495	0.04547	0.03897	0.03248	0.02598	0.01949
49000	0.00946	0.06234	0.04364	0.03740	0.03117	0.02494	0.01870
50000	0.00897	0.05987	0.04191	0.03592	0.02993	0.02395	0.01796
51000	0.00853	0.05753	0.04027	0.03452	0.02876	0.02301	0.01726
52000	0.00817	0.05529	0.03870	0.03317	0.02764	0.02212	0.01659
53000	0.00779	0.05315	0.03721	0.03189	0.02658	0.02126	0.01595
54000	0.00741	0.05111	0.03578	0.03067	0.02556	0.02045	0.01533
55000	0.00707	0.04917	0.03442	0.02950	0.02459	0.01967	0.01475
56000	0.00669	0.04733	0.03313	0.02840	0.02367	0.01893	0.01420
57000	0.00637	0.04558	0.03191	0.02735	0.02279	0.01823	0.01367
58000	0.00605	0.04392	0.03074	0.02635	0.02196	0.01757	0.01318
59000	0.00579	0.04234	0.02963	0.02540	0.02117	0.01693	0.01270
60000	0.00549	0.04082	0.02858	0.02445	0.02041	0.01633	0.01225

Table 5-3 (continued)

Threshold	of Persons Exceeding Threshold	% of Dollars Exceeding Threshold	% of Total Expenditures in Outlier Pool Based on Level of Plan Coinsurance				
			30%	40%	50%	60%	70%
61000	0.00522	0.03939	0.02757	0.02343	0.01970	0.01576	0.01182
62000	0.00494	0.03803	0.02662	0.02242	0.01901	0.01521	0.01141
63000	0.00470	0.03674	0.02572	0.02244	0.01837	0.01469	0.01102
64000	0.00448	0.03550	0.02485	0.02110	0.01775	0.01420	0.01065
65000	0.00431	0.03433	0.02403	0.02060	0.01716	0.01373	0.01030
66000	0.00409	0.03320	0.02324	0.01912	0.01660	0.01328	0.00996
67000	0.00391	0.03213	0.02249	0.01918	0.01606	0.01285	0.00964
68000	0.00373	0.03110	0.02177	0.01816	0.01555	0.01244	0.00933
69000	0.00357	0.03013	0.02109	0.01818	0.01506	0.01205	0.00904
70000	0.00341	0.02919	0.02043	0.01711	0.01459	0.01167	0.00876
75000	0.00278	0.02505	0.01753	0.01503	0.01252	0.01002	0.00751
80000	0.00233	0.02162	0.01513	0.01217	0.01081	0.00865	0.00649
85000	0.00199	0.01873	0.01311	0.01114	0.00936	0.00749	0.00562
90000	0.00162	0.01633	0.01143	0.00960	0.00816	0.00653	0.00490
95000	0.00136	0.01434	0.01004	0.00860	0.00717	0.00574	0.00430
100000	0.00118	0.01265	0.00886	0.00751	0.00633	0.00506	0.00380
105000	0.00103	0.01117	0.00782	0.00670	0.00558	0.00447	0.00335
110000	0.00088	0.00989	0.00692	0.00594	0.00495	0.00396	0.00297
115000	0.00076	0.00881	0.00616	0.00518	0.00440	0.00352	0.00264
120000	0.00066	0.00786	0.00550	0.00452	0.00393	0.00314	0.00236
125000	0.00057	0.00704	0.00493	0.00423	0.00352	0.00282	0.00211
130000	0.00050	0.00632	0.00442	0.00379	0.00316	0.00253	0.00190
135000	0.00044	0.00570	0.00399	0.00342	0.00285	0.00228	0.00171
140000	0.00038	0.00514	0.00360	0.00308	0.00257	0.00206	0.00154
145000	0.00034	0.00465	0.00326	0.00279	0.00233	0.00186	0.00140
150000	0.00028	0.00424	0.00297	0.00254	0.00212	0.00169	0.00127
160000	0.00023	0.00356	0.00250	0.00214	0.00178	0.00143	0.00107
170000	0.00018	0.00301	0.00211	0.00181	0.00151	0.00121	0.00090
180000	0.00016	0.00256	0.00179	0.00153	0.00128	0.00102	0.00077
190000	0.00013	0.00218	0.00153	0.00131	0.00109	0.00087	0.00065
200000	0.00011	0.00187	0.00131	0.00112	0.00093	0.00075	0.00056
210000	0.00010	0.00160	0.00112	0.00096	0.00080	0.00064	0.00048
220000	0.00009	0.00136	0.00095	0.00081	0.00068	0.00054	0.00041
230000	0.00008	0.00114	0.00079	0.00068	0.00057	0.00045	0.00034
240000	0.00006	0.00094	0.00066	0.00056	0.00047	0.00038	0.00028
250000	0.00005	0.00079	0.00056	0.00048	0.00040	0.00032	0.00024
275000	0.00003	0.00055	0.00038	0.00033	0.00027	0.00022	0.00016
300000	0.00002	0.00037	0.00026	0.00022	0.00018	0.00015	0.00011
325000	0.00001	0.00023	0.00016	0.00014	0.00012	0.00009	0.00007
350000	0.00001	0.00016	0.00011	0.00009	0.00008	0.00006	0.00005
375000	0.00001	0.00011	0.00008	0.00007	0.00005	0.00004	0.00003
400000	0.00001	0.00007	0.00005	0.00004	0.00003	0.00003	0.00002
425000	0.00000	0.00003	0.00002	0.00002	0.00002	0.00001	0.00001
450000	0.00000	0.00001	0.00001	0.00001	0.00001	0.00000	0.00000
475000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
500000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

exceeding the thresholds, Table 5-3 identifies: (1) the percentage of persons who have claims exceeding each threshold, and (2) the expected outlier pool claims based on varying levels of coinsurance paid by the participating HMOs. For example, Table 5-3 indicates that outlier pool payments for Minneapolis/St. Paul in 1995 would represent approximately 5.50 percent of total expenditures based on the following assumptions: (1) national one percent sample historical data, (2) a threshold of \$40,000, (3) average AAPCC payment rate of \$327.93 per month, and (4) an HMO coinsurance rate of 40 percent (i.e., the plan is responsible for 40 percent of expenditures above the threshold level of \$50,000, and receives reimbursement for 60 percent of expenditures above the threshold from the outlier pool). Tables similar to Table 5-3 are contained in Appendix A for the different market areas and the different data sources.

#### Issues Related to Development and Implementation of Outlier Pools

There are a number of issues that need to be considered in designing the outlier pools and selecting thresholds that are appropriate for the proposed demonstration. This section discusses some of these issues, which have been grouped into three categories: (1) conceptual issues, (2) technical issues, and (3) operational issues.

#### Conceptual Issues

The development of thresholds for an outlier pool is dependent upon appropriate data and methods of analysis. Several conceptual issues are identified and discussed below.

1. Appropriate historical data to use as basis for threshold. The threshold will identify the claims eligible for reimbursement from the outlier pool and determine the amount to be paid to the participating plan (after consideration of coinsurance and adjustments for definition of allowable costs, etc.). An accurate threshold is necessary so that the aggregate claims paid in each market area will be approximately equal to the percentage of AAPCC allocated

to the outlier pool.

There are at least four potential sources of historical data that can be used as the basis to determine the threshold: (1) cost data from participating HMOs in the market area, (2) HMO data from other areas, (3) Medicare data for the market area, and (4) national Medicare data. Each data source has advantages and limitations. The national Medicare CMHS data is internally consistent, a large sample is available for analysis, and it can be calibrated to each local area. However, the national data may not reflect local conditions, especially differences in utilization and costs due to local HMO practice patterns. In addition, fee-for-service data must be adjusted to reflect differences in HMO and fee-for-service cost patterns for large claimants.

Medicare data for the local market area would be expected to better reflect local factors affecting health costs. However, the size of samples available from the CMHS may be too small for construction of continuance tables, and the local CMHS data may not reflect HMO utilization and cost patterns.

HMO cost and utilization data, especially for the plans participating in the demonstration, would probably be the best data source. However, there may be problems in consistency of data definitions, methods of recording costs, or other differences among plans that could pose problems in estimating outlier pool expenditures. Costs for capitated providers pose additional problems.

2. Measurement of costs. In order for the outlier pool to operate in a fair and equitable manner, it is necessary that costs be defined in a comparable way between the participating HMOs in each market area. For hospital and physician services, the Medicare prospective payment system and physician fee schedule (RBRVS) are examples of systems that could serve as mechanisms to define costs in a comparable manner between different HMOs.

3. Risk-sharing between HCFA and participating HMOs. One key issue for the demonstration is the amount that will be placed at risk in the outlier pool. From the HCFA perspective, it is desirable to have as large a percentage of

AAPCC as practical in the outlier pool because it would allow for an effective test of the concept by covering a greater proportion of outliers. Since many HMO provider contracts are based on fixed payments, HMO concerns focus on the adequacy of the minimum guaranteed payment level and the total amount of reimbursement that is at risk.

4. Impact of coinsurance. Given a fixed amount of funding in the outlier pool, the threshold decreases as the level of coinsurance increases. Since outlier payments involve high-cost cases and the tail of the expenditure distribution, the coinsurance percentage can have a major impact on the threshold. Higher levels of coinsurance should increase incentives for participating plans to constrain costs for high-cost cases.

5. Impact of Medicare program changes. Since the demonstration period will be from 1995 to 1997, it is necessary to consider proposed changes in the Medicare program that might affect the costs for the demonstration.

6. Impact of changes in AAPCC methodology. One of the proposed provisions in the demonstration is for fixed AAPCC payment rates for 1995, 1996 and 1997. Thus, the impact of recent and proposed changes in the methodology to determine the AAPCC payment rates should be taken into account in calculating the rates for 1996 and 1997.

#### Technical Issues

As discussed above, there are a variety of technical issues that are involved with development of appropriate thresholds for the outlier pool. Some of these issues are discussed below.

1. Basic method to determine threshold. The results presented in the previous section used a standard actuarial technique based on continuance tables. Demonstration participants need to understand and agree on the best data and methods to be used in calculating appropriate thresholds.
2. Method for projection of threshold from base period to demonstration period. Different methods were demonstrated in the previous section for projecting thresholds from a base period to a future period. The percentage

of claims exceeding a specified threshold is very sensitive to the projection technique and also to the accuracy of the assumptions regarding inflation and health care cost increases in future years.

3. Demographic and geographic adjustments. It is also necessary to take into account differences in demographic or geographic factors between the baseline data and the participating HMOs in each market area.

4. Other potential adjustments required. Other factors that might require adjustments in determining thresholds include: coinsurance effects, Medicare program changes, AAPCC changes, etc.

5. Accounting for statistical variations. Differences between actual and expected outlier pool payments will vary depending on the number of HMO enrollees at each demonstration site, among other factors. Unless a site has a very large base of enrollment (100,000 persons or more), statistical variations alone can cause significant outlier pool surpluses or shortfalls from year to year.

#### Operational Issues

The third set of issues relate to the actual operation of the outlier pools and potential problems that might occur.

1. Definition of covered services and eligibility categories. For each demonstration site, HCFA and the participating HMOs need to define the set of medical services that will be approved for the outlier pool (i.e., specify any additions or differences from the standard Medicare benefit package such as prescription drugs, etc.) and also define categories of eligibility for the outlier pool (aged, disabled, ESRD, etc.).

2. Procedures for making payments to plans. The different types of payments to participating HMOs could include: (1) interim capitation payments (the portion of the AAPCC payment not allocated to the outlier pool), (2) interim outlier payments/draw from pool (based on actual claims incurred by each plan for high-cost cases), and (3) annual reconciliation (including the final bills for high-cost cases that occurred during the year).



3. Annual surpluses and shortfalls. For each demonstration site, HCFA and the participating plans would have to agree on the methods to handle annual surpluses and shortfalls that would occur in the outlier pool. For example, the surplus or shortfall could be carried over to the next year, and the threshold and plan coinsurance percentage for the next year could be adjusted accordingly. A second method could be established for allocation of the surplus or shortfall among the participating plans at the end of each year as part of the annual reconciliation (each plan could assume a pro-rata share of the surplus/shortfall based on outlier pool claims, relative contributions to the pool, etc.).

A third method could involve withholds on the interim payments made from the risk pool to the plans. A portion of the interim payments from the risk pool (10 percent to 30 percent) could be withheld until the end of the year. If total claims on the risk pool were less than the total funds allocated to the risk pool, the withhold amounts would be paid along with any end-of-year settlements. If total claims exceeded risk pool funds and the amount of the withholds was more than the shortfall, then a portion of the amount withheld would be used to pay the shortfall and the remainder distributed to the participating plans. If the amount of the withhold was less than the shortfall, then the difference between the shortfall and the amount withheld would have to be made up by the plans or carried over to the next year.

4. Adjustments required for 1996 and 1997. As discussed above, an outlier pool depends on the frequency and size of high-cost cases in a given year and, thus, is sensitive to the actual incidence of high-cost cases and the distribution of expenditures exceeding the outlier pool threshold. It is likely that adjustments to the procedures for operating the outlier pool will be required for the second and third years of the demonstration. Adjustments may be required in threshold levels, coinsurance percentages, interim payment provisions, annual reconciliation and final payment provisions, and other operational features of the outlier pool.

## 5.2 The Cost of Reinsurance Options in the Medicare Choices Demonstration

ARC was asked in June 1995 to provide tabulations and analysis for reinsurance options in the Medicare Choices Demonstration. It was expected that the reinsurance coverage would be provided with the Medicare program as the reinsurer. Participating health plans could obtain the reinsurance in exchange for a reduction in the AAPCC (or average payment rate) that is paid by HCFA to the plan. The results of the analysis of reinsurance options for the Medicare Choices Demonstration are contained in Appendix B.

To analyze the cost of reinsurance options for health plans that are participating in the Medicare Choices Demonstration, national Medicare data were used to prepare a set of reinsurance tabulations. It was assumed that the reinsurance coverage would provide individual stop-loss protection for high-cost patients based on medical costs incurred during a calendar year. In order to maintain incentives for plans to constrain costs for high-cost cases, plans would be required to pay coinsurance on costs that exceed the reinsurance threshold amount.

Continuance tables were developed from historical data for calendar year 1992. To apply the continuance table results to the first year of the demonstration (calendar year 1996), it was necessary to project the distribution of high-cost cases affected by the reinsurance program from the historical period to 1996. This was accomplished by scaling the expenditure distribution using the relative per capita costs in the two periods.

The objective was to set a reinsurance level based on: (1) the level of the AAPCC, (2) the percentage of the total Medicare expenditures that exceed the reinsurance threshold, and (3) a specified plan coinsurance rate. As discussed below, the level of the AAPCC corresponds to the average monthly payment rate for a health plan that is participating in the Medicare Choices Demonstration. As the payment rate (cost of care) increases, it is assumed that the proportion of expenditures that exceed a specified threshold also increases.

The tables for the reinsurance tabulations in Appendix B were derived

from a one percent national sample from the Continuous Medicare History Sample (CMHS). A separate tabulation was made for each of the projected 1996 AAPCC levels (\$200, \$225, . . . , \$700). The 1992 Medicare expenditure data were adjusted to each specific 1996 AAPCC level by scaling the 1992 expenditure distribution according to the ratio of the 1996 AAPCC level to the mean of the 1992 expenditures. For example, the average 1992 cost was \$280.25 per member per month. For the projected 1996 AAPCC level of \$400 per member per month, the scaling ratio was 1.4273 ( $\$400 / \$280.25$ ). Each person's Medicare cost in the 1992 CMHS file was multiplied by 1.4273, and a continuance table was calculated based on the resulting adjusted expenditures.

To account for the wide variation in AAPCC levels and the corresponding impact on reinsurance provided by Medicare, continuance tables were prepared for a range in AAPCC values from \$200 per month to \$700 per month (\$200, \$225, \$250, \$275, \$300, . . . , \$700). These tables are contained in Appendix B. In addition to the percentage of persons and percentage of dollars exceeding specified thresholds, the tables also show the impact of different plan coinsurance rates. Reinsurance tables are contained in Appendix B for: (1) total Medicare expenditures, and (2) inpatient hospital expenditures only.

Table 5-4 summarizes the results contained in Appendix B. As shown in the table, for a reinsurance threshold of \$50,000, the percentage of total expenditures that exceed the threshold increases from 1.70 percent for plans with an average AAPCC value of \$200 per month to 19.50 percent for plans with an average AAPCC value of \$700 per month.

In order to test the robustness of the results, we also used data from the five percent CMHS database for a sample of rural counties with low AAPCCs. We were concerned that scaling the national data may be inappropriate for rural counties with low AAPCCs because of different practice patterns, less access to hospitals or tertiary care facilities, fewer catastrophic or high-cost cases, and other factors. Therefore, we investigated the robustness of the scaling technique and the continuance table results using data for a sample of rural counties with low AAPCCs (less than 80 percent of the U.S. per

Percentage of Total Expenditures that Exceed Selected Thresholds by Level of AAPCC

Threshold	AAPCC Payment per Person per Month										
	\$200	\$250	\$300	\$350	\$400	\$450	\$500	\$550	\$600	\$650	\$700
\$5,000	49.22%	55.11%	59.64%	63.26%	66.21%	68.66%	70.72%	72.49%	74.02%	75.36%	76.55%
\$10,000	29.25	35.79	41.13	45.53	49.22	52.38	55.11	57.51	59.64	61.55	63.26
\$15,000	18.27	24.12	29.25	33.76	37.69	41.13	44.15	46.83	49.22	51.38	53.33
\$20,000	11.81	16.71	21.28	25.47	29.25	32.69	35.79	38.59	41.13	43.43	45.53
\$25,000	7.90	11.82	15.75	19.50	23.00	26.26	29.25	32.03	34.59	36.95	39.12
\$30,000	5.52	8.53	11.82	15.10	18.28	21.28	24.12	26.77	29.25	31.58	33.76
\$35,000	3.99	6.34	8.99	11.82	14.64	17.39	20.01	22.52	24.89	27.14	29.25
\$40,000	2.96	4.83	6.98	9.34	11.82	14.29	16.71	19.04	21.28	23.42	25.47
\$45,000	2.23	3.75	5.52	7.49	9.61	11.82	14.02	16.18	18.27	20.30	22.25
\$50,000	1.70	2.96	4.43	6.09	7.90	9.83	11.82	13.80	15.75	17.65	19.50
\$55,000	1.32	2.36	3.60	5.02	6.57	8.24	10.01	11.82	13.62	15.40	17.14
\$60,000	1.04	1.90	2.96	4.17	5.52	6.98	8.53	10.16	11.82	13.47	15.10
\$65,000	.82	1.54	2.45	3.50	4.68	5.96	7.33	8.78	10.28	11.82	13.43
\$70,000	.66	1.26	2.04	2.96	3.99	5.12	6.34	7.63	8.99	10.39	11.82
\$75,000	.53	1.04	1.70	2.51	3.43	4.43	5.52	6.68	7.90	9.18	10.49
\$80,000	.43	.86	1.44	2.15	2.96	3.86	4.83	5.88	6.98	8.14	9.34
\$85,000	.34	.72	1.22	1.84	2.56	3.37	4.25	5.19	6.19	7.25	8.35
\$90,000	.28	.60	1.04	1.58	2.23	2.96	3.75	4.61	5.52	6.48	7.49
\$95,000	.23	.50	.89	1.37	1.95	2.60	3.32	4.11	4.94	5.82	6.74
\$100,000	.19	.43	.76	1.19	1.70	2.30	2.96	3.67	4.43	5.24	6.09
\$105,000	.16	.36	.66	1.04	1.50	2.04	2.64	3.29	3.99	4.74	5.52
\$110,000	.14	.30	.57	.91	1.32	1.81	2.36	2.96	3.60	4.29	5.02
\$115,000	.12	.26	.49	.80	1.17	1.61	2.12	2.66	3.26	3.90	4.57
\$120,000	.10	.22	.43	.70	1.04	1.44	1.90	2.41	2.96	3.55	4.17
\$125,000	.08	.19	.37	.62	.93	1.29	1.70	2.18	2.69	3.24	3.82

capita cost) from the five percent CMHS database. The continuance table results are contained in Appendix B for AAPCC values of \$200, \$250, \$300, \$350 and \$400. Although there are some differences in the results using the different data sets, it appears that the differences are relatively minor.

#### How to Apply the Reinsurance Tables

The first step in applying the reinsurance tables in Appendix B is to determine the "average payment rate." The average payment rate is the amount per person per month that is paid by HCFA to the participating health plan. For Medicare risk contractors, the average payment rate reflects: (1) the AAPCCs in the counties served by the HMO/CMP, (2) the distribution of eligibles across the counties, and (3) the demographic mix of enrollees according to the AAPCC underwriting factors. For a health plan participating in the Medicare Choices Demonstration, the average payment rate is the final negotiated rate, on a per member per month basis, to be paid by HCFA to the health plan for Medicare eligibles.

The second step is to specify the parameters for reinsurance that have been determined by HCFA (or jointly by HCFA and the participating health plan). Relevant reinsurance parameters include the plan coinsurance rate and the percentage of AAPCC to be provided as reinsurance coverage.

The third step is to determine the reinsurance threshold (i.e., the claims level at which the reinsurance begins to cover a portion of the expenses that exceed the threshold). The tables contained in Appendix B are used as look-up tables to identify reinsurance thresholds. The first column in each table is the threshold amount that corresponds to the deductible for the individual stop-loss reinsurance coverage. It is assumed that, once an enrolled person's medical expenses exceed the threshold during a calendar year, a participating plan will be reimbursed a specified percentage of allowable expenses exceeding the threshold/deductible.

The second column is the proportion of persons that have expenses that exceed the threshold. The third column is the proportion of total expenses

that exceed the threshold. For example, in Table 1 on page B-2 of Appendix B (AAPCC equals \$200 per month), 13.0 percent of all persons have expenses that exceed \$5,000 per year, and 49.2 percent of all expenses exceed the \$5,000 threshold.

The fourth to eighth columns correspond to the proportion of total expenditures that exceed the threshold, given the specified levels of plan coinsurance. For example, with a \$50,000 threshold and 30 percent plan coinsurance, Table 1 in Appendix B indicates that Medicare payments would equal 1.2 percent of total expenditures (Medicare would pay 70 percent of expenses that exceed the \$50,000 threshold).

For reference to the appropriate table in Appendix B, the average payment rate should be rounded to the closest \$25. For example, if the average payment rate is \$292.87, then Table 5 in Appendix B corresponding to \$300 per month should be used. The next step involves the plan coinsurance rate (i.e., the proportion of expenses above the reinsurance threshold that is the responsibility of the health plan). Assume that the plan coinsurance rate equals 30 percent, and that HCFA desires to provide reinsurance coverage equal to two percent of the AAPCC. As seen in Table 5 of Appendix B (page B-17), the proportion of expenses that exceed a \$60,000 threshold with 30 percent coinsurance is approximately 2.07 percent. Similarly, the proportion of expenses that exceed a \$61,000 threshold with 30 percent coinsurance is 1.99 percent. If the average payment rate was rounded up (as in the example), then the lower threshold should be used (the higher threshold should be used if the average payment rate was rounded down). Therefore, in this example, a reinsurance threshold of \$60,000 should be established to provide reinsurance coverage of two percent of the AAPCC. The corresponding monthly premium rate to be charged for the reinsurance equals two percent of the monthly payment rate, or \$5.86 (.02 times \$292.87).

The reinsurance results in Table 5-4 are based on national fee-for-service data, as requested by ORD. However, reinsurance premiums charged by private reinsurance companies for new health plans are usually lower than

those implied by the results in Table 5-4 since the premiums charged by private reinsurance companies reflect the actual cost experience of each company. Compared to national fee-for-service data, the actual cost experience of new health plans serving Medicare enrollees is lower because of factors such as a younger mix of enrollees, favorable selection, and effective utilization management by the health plan.

Reinsurance Estimates for End Stage Renal Disease (ESRD) Eligibles

Another aspect of reinsurance coverage involves the impact on expected reinsurance costs if a health plan enrolled a cohort of primarily high-cost persons. Medicare ESRD eligibles were selected as an example of a high-cost subgroup. To illustrate the high-cost nature of the ESRD population, consider the 1995 U.S. Per Capita Costs (USPCCs) for aged, disabled, and ESRD eligibles that are calculated in conjunction with derivation of the annual Adjusted Average Per Capita Cost (AAPCC) county factors:

	<u>1995 USPCC Cost per Month</u>		
	<u>Part A</u>	<u>Part B</u>	<u>Total</u>
Aged	\$251.61	\$148.91	\$400.52
Disabled	223.99	131.82	355.81
ESRD	1,520.42	2,153.81	3,674.23

	<u>Ratio to Aged USPCC</u>		
	<u>Part A</u>	<u>Part B</u>	<u>Total</u>
Aged	1.00	1.00	1.00
Disabled	.89	.89	.89
ESRD	6.04	14.46	9.17

Thus, ESRD eligibles are approximately six times as expensive as aged eligibles for Part A services, over 14 times as expensive as aged eligibles for Part B services, and 9 times as expensive as aged eligibles for all

Medicare services.

To compare the expected reinsurance costs for ESRD eligibles versus aged eligibles, a continuance table was calculated using Medicare expenditures for ESRD eligibles contained in the one percent national sample (approximately 2100 persons). The ESRD continuance table provides the percent of ESRD expenditures exceeding various reinsurance thresholds.

Using the 1995 USPCCs as the average monthly cost for aged and ESRD eligibles and assuming that plan coinsurance is 40 percent, then the percent of expenditures that exceed specified thresholds for aged vs. ESRD eligibles are as follows:

<u>Reinsurance Threshold</u>	<u>% of Costs that Exceed Threshold</u>	
	<u>Aged</u>	<u>ESRD</u>
\$10,000	29.5%	49.3%
20,000	17.6	39.9
30,000	11.0	31.2
40,000	7.1	24.0
50,000	4.7	18.5
60,000	3.3	14.3
70,000	2.4	11.0
80,000	1.3	8.4
90,000	1.3	6.4
100,000	1.0	4.9

As seen in the above figures, approximately 40 percent of ESRD expenditures would exceed a \$20,000 reinsurance threshold, compared to 18 percent of aged expenditures. The disparity between the aged and ESRD results increases as the threshold increases. For a \$50,000 threshold, the proportion of ESRD expenditures exceeding the threshold is more than triple the comparable proportion of aged expenditures (18.5 percent vs. 4.7 percent). With a \$100,000 threshold, the proportion of ESRD expenditures that exceed the threshold (4.9 percent) is almost five times the comparable proportion of aged expenditures (1.0 percent).

Therefore, it is clear that reinsurance costs for aged eligibles are very different than for ESRD eligibles. If a health plan enrolled a high-cost group of Medicare eligibles, it is expected that the number of catastrophic cases and expenditures subject to reinsurance will differ substantially from



the cost experience of a representative sample of Medicare aged and disabled eligibles. The cost of reinsurance coverage for such a high-cost enrolled group should be based on the specific characteristics of that group.

Some of the partial capitation and experience rating models described in earlier chapters of this report included aspects of reinsurance (primarily individual stop-loss reinsurance) in their design. Selected models which include reinsurance are compared to other alternative payment models in Chapter 6.

Comparison of Alternative Payment Methods

In this chapter, alternative payment methods are compared and evaluated. The purpose of this study was to evaluate four alternative payment methods for risk HMOs: (1) reinsurance, (2) select and ultimate rates, (3) partial capitation and blended rates, and (4) experience rating. Reinsurance methods provide protection to participating health plans against the cost of high-cost cases and catastrophic expenses. Methods using select and ultimate rates take into account the regression to the mean phenomenon and other trends in health care costs over time. Partial capitation methods place health plans at risk for less than 100 percent of the full capitation amount by covering selected services (physician services, Part B services, etc.) or other defined coverage arrangements. Experience rating approaches are based on the prior cost experience of the health plan and can involve prospective, retrospective or mixed methods. An experience rating system can be viewed as a form of risk adjustment system.

The comparison of models in this chapter focuses on the statistical accuracy and reliability of various models. An assessment of the alternative payment methods and the inherent trade-offs for each type of model is contained in Chapter 7.

6.1 Selection of Alternative Payment Models for Comparison

A variety of alternative payment models were investigated in Chapters 2 to 5. In this chapter, we attempted to select the best representatives of each type of payment method and compare their statistical results against each other and also against the basic AAPCC payment method. A key feature of each payment method is the proportion of payments that are made prospectively. Therefore, the models selected for comparison differed according to the percentage of prospective payments for each model.

The following payment models were selected for comparison:

- Model 1 - AAPCC
- Model 2 - Experience rating
- Model 3 - Select and ultimate rates - regression to the mean
- Model 4 - Partial capitation - AAPCC with 3-tier risk corridors
- Model 5 - Blended rates - experience rating with both pooling of base year (1990) claims above \$50,000 and reinsurance above \$50,000 for 1992 claims (with 30% plan coinsurance)
- Model 6 - AAPCC with reinsurance for claims above \$20,000, with 30% plan coinsurance
- Model 7 - Blended rates, experience rating with both pooling of base year (1990) claims above \$20,000 and reinsurance above \$20,000 for 1992 claims (with 30% plan coinsurance)
- Model 8 - Partial capitation with Part B capitated and Part A capitated up to \$20,000, with capped risk corridor (50% risk sharing up to  $\pm$  20%)
- Model 9 - Select and ultimate rates, with 20% reduction for persons enrolled less than 2 years, and pooling of base year (1990) claims above \$15,000 and reinsurance above \$15,000 for 1992 claims (with 30% plan coinsurance)
- Model 10 - Partial capitation with Part B capitated and Part A capitated up to \$10,000, with capped risk corridor (50% risk sharing up to  $\pm$  20%)
- Model 11 - Blended rates, experience rating with both pooling of base year (1990) claims above \$5,000 and reinsurance above \$5,000 for 1992 claims
- Model 12 - Partial capitation, with Part B capitated and cost reimbursement for Part A services

The models are shown in Table 6-1 with the percentage of total payments to the plan that are on a prospective basis. The models are ranked according to the percentage of prospective payments.

The first five models have 97 - 100 percent prospective payments.

Models 1 - 3 are 100 percent prospective, fully capitated models. Model 4 uses partial capitation with AAPCC payments and 3-tier risk corridors. Model 4 has 97 percent prospective payments, with 3 percent risk-sharing payments. Model 5 uses pooling of claims and reinsurance above \$50,000 per case, which results in approximately 3 percent retrospective payments. Thus, Model 5 has 97 percent prospective payments.

Models 6 - 8 have prospective payments in the range of 83 percent to 85 percent. Model 6 uses the AAPCC with reinsurance for claims above \$20,000,

Table 6-1

Alternative Payment Models to be Evaluated and  
Percentage of Prospective Payments

<u>Prospective Payments (%)</u>	<u>Model</u>
100%	Model 1 - AAPCC
100	Model 2 - Experience rating
100	Model 3 - Select and ultimate rates - regression to the mean
98	Model 4 - Partial capitation - AAPCC with 3-tier risk corridors
97	Model 5 - Blended rates - experience rating with both pooling of base year (1990) claims above \$50,000 and reinsurance above \$50,000 for 1992 claims (with 30% plan coinsurance)
85	Model 6 - AAPCC with reinsurance for claims above \$20,000, with 30% plan coinsurance
84	Model 7 - Blended rates, experience rating with both pooling of base year (1990) claims above \$20,000 and reinsurance above \$20,000 for 1992 claims (with 30% plan coinsurance)
84	Model 8 - Partial capitation with Part B capitated and Part A capitated up to \$20,000, with capped risk corridor (50% risk sharing up to $\pm$ 20%)
74	Model 9 - Select and ultimate rates, with 20% reduction for persons enrolled less than 2 years, and pooling of base year (1990) claims above \$15,000 and reinsurance above \$15,000 for 1992 claims (with 30% plan coinsurance)
71	Model 10 - Partial capitation with Part B capitated and Part A capitated up to \$10,000, with capped risk corridor (50% risk sharing up to $\pm$ 20%)
46	Model 11 - Blended rates, experience rating with both pooling of base year (1990) claims above \$5,000 and reinsurance above \$5,000 for 1992 claims
36	Model 12 - Partial capitation, with Part B capitated and cost reimbursement for Part A services

with 30 percent plan coinsurance. Model 7 uses blended rates with experience rating and pooling of claims above \$20,000 in the base year (1990) and reinsurance for claims above \$20,000 in the projected year (1992). Model 8 is a partial capitation model with Part B and the portion of Part A under \$20,000 capitated, and a capped risk corridor with 50 percent risk sharing up to  $\pm$  20 percent.

Models 9 and 10 have prospective payments of 74 percent and 71 percent, respectively. Model 9 uses select and ultimate rates with 20 percent reduction for persons enrolled less than two years, and reinsurance above \$20,000 with 30 percent plan coinsurance. Model 10 uses partial capitation with Part B and a portion of Part A (up to \$10,000) capitated, and with a capped risk corridor (50 percent risk sharing up to  $\pm$  20 percent).

Models 11 and 12 have relatively low proportions of prospective payments. Model 11 uses blended rates with experience rating and has prospective payments of 46 percent. Model 12 uses partial capitation with Part B capitated and cost reimbursement for Part A. Model 12 has 36 percent prospective payments.

As noted above, many of the models use blended rates or a combination of two or more of the rate-setting techniques described in previous chapters. The characteristics of each payment method affect both the proportion of prospective payments and the level of statistical accuracy.

## 6.2 Results of Comparison of Alternative Payment Models

Table 6-2 summarizes the statistical results on the accuracy and reliability of the alternative payment models. Data for the geographic-based groups from the CMHS data file are shown in Table 6-2.

The top portion of Table 6-2 shows the absolute value of the difference, in dollars, between the 1992 estimated payments to the health plan and the actual 1992 costs of the persons in the groups of a given size. As can be seen in Table 6-2, for the models with 97 - 100 percent of prospective payments (Models 1-5), Model 4 with AAPCC payments and a 3-tier risk corridor

Table 6-2

## Summary Comparison Statistics, by Group Size, for Alternative Payment Methods

	Model 1	Alternative Payment Methods*										
	AAPCC	2	3	4	5	6	7	8	9	10	11	
<u>Mean Absolute Value of Error in Predicted Payments</u>												
500 (N=185)	\$38	\$45	\$5	\$21	\$38	\$28	\$28	\$14	\$22	\$11	\$10	\$11
1,000 (N=56)	28	33	36	17	30	23	22	11	17	9	8	9
2,500 (N=52)	28	26	45	19	23	25	15	13	12	11	6	9
5,000 (N=20)	22	15	41	15	14	22	9	11	7	10	4	8
10,000 (N=18)	18	16	29	13	14	16	9	8	8	8	3	5
20,000 (N=11)	17	14	23	12	13	18	9	10	6	8	3	4
All Groups (N=342)	32	36	42	19	31	25	23	12	18	10	8	10
<u>Mean Absolute Value of Percent Error in Predictive Ratio</u>												
500	13%	15%	16%	7%	13%	9%	10%	5%	8%	4%	3%	4%
1,000	9	10	12	5	9	7	7	3	5	3	3	3
2,500	9	8	14	6	7	8	5	4	4	3	2	3
5,000	7	5	15	5	5	7	3	4	2	3	1	3
10,000	6	5	10	4	4	5	3	2	2	2	1	2
20,000	5	4	6	4	4	5	3	3	2	2	1	1
All Groups	11	12	15	6	10	8	8	4	6	3	3	3
<u>Percent of Groups with Error Less than 5 Percent</u>												
500	24%	23%	23%	37%	30%	31%	34%	56%	43%	70%	77%	71%
1,000	43	29	29	54	36	50	4	75	61	84	86	86
2,500	44	40	17	54	44	42	60	64	65	69	96	81
5,000	35	50	25	45	60	45	90	70	95	75	100	90
10,000	61	44	33	78	61	56	83	89	94	94	100	94
20,000	64	73	46	73	82	73	91	82	91	91	100	100
All Groups	34	31	24	46	38	39	48	64	56	74	85	78

Table 6-2 (continued)

Summary Comparison Statistics, by Group Size, for Alternative Payment Methods

	Model 1 AAPCC	Alternative Payment Methods*										
		<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
<u>Percent of Groups with Error Greater than 10 Percent</u>												
500	52%	54%	59%	20%	51%	41%	38%	5%	31%	2%	3%	4%
1,000	29	36	46	9	34	23	18	5	14	2	2	0
2,500	42	29	54	15	29	37	12	4	8	0	0	0
5,000	25	10	60	5	10	30	0	0	0	0	0	0
10,000	17	17	56	0	0	11	0	0	0	0	0	0
20,000	27	9	18	0	9	18	0	0	0	0	0	0
All Groups	43	41	55	15	39	35	25	4	20	1	2	2
<u>Product Moment Correlation</u>												
500	.70	.59	.68	.94	.71	.87	.85	.97	.90	.98	.98	.98
1,000	.78	.75	.73	.94	.79	.88	.90	.97	.93	.98	.99	.98
2,500	.92	.92	.92	.97	.94	.95	.97	.99	.98	.99	1.00	.99
5,000	.95	.97	.96	.98	.98	.97	.99	.99	.99	.99	1.00	.99
10,000	.88	.91	.87	.95	.93	.93	.97	.98	.98	.99	1.00	.99
20,000	.83	.91	.82	.92	.93	.91	.98	.97	.99	.98	1.00	.98
All Groups	.79	.74	.78	.95	.80	.89	.90	.97	.94	.98	.99	.98
<u>R-squared</u>												
500	.48	.24	.30	.87	.50	.74	.72	.94	.82	.96	.97	.96
1,000	.54	.45	.36	.87	.62	.68	.79	.94	.86	.96	.97	.95
2,500	.81	.84	.52	.93	.88	.84	.94	.96	.96	.97	.97	.98
5,000	.87	.94	.60	.95	.96	.87	.98	.97	.99	.97	1.00	.98
10,000	.72	.81	.49	.88	.87	.74	.94	.94	.97	.95	1.00	.98
20,000	.65	.81	.33	.85	.87	.70	.95	.92	.97	.93	1.00	.98
All Groups	.61	.49	.40	.89	.64	.77	.81	.95	.87	.96	.98	.97





Table 6-2 (continued)

Summary Comparison Statistics, by Group Size, for Alternative Payment Methods

	Model 1	Alternative Payment Methods*										
	AAPCC	2	3	4	5	6	7	8	9	10	11	12
<u>Mean Squared Error as Percent of Mean Prospective Payment</u>												
500	16%	19%	19%	8%	17%	13%	14%	6%	13%	6%	9%	13%
1,000	12	14	15	7	13	12	10	5	9	5	7	11
2,500	11	10	17	7	9	12	7	6	7	6	5	9
5,000	9	6	16	6	6	11	4	5	4	6	3	9
10,000	8	6	11	5	6	9	4	4	4	4	2	7
20,000	7	5	10	5	5	8	4	4	3	4	2	5
All Groups	14	16	17	7	14	12	12	6	11	6	8	11
% Prospective Payment	100%	100%	100%	98%	97%	85%	84%	83%	74%	74%	46%	36%

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 \* The alternative payment models are:

- Model 1 - AAPCC
- Model 2 - Experience rating
- Model 3 - Select and ultimate rates - regression to the mean
- Model 4 - Partial capitation (risk corridors) - AAPCC with 3-tier risk corridors
- Model 5 - Blended rates - experience rating with both pooling of base year (1990) claims above \$50,000 and reinsurance above \$50,000 for 1992 claims (with 30% plan coinsurance)
- Model 6 - AAPCC with reinsurance for claims above \$20,000, with 30% plan coinsurance
- Model 7 - Blended rates, experience rating with both pooling of base year (1990) claims above \$20,000 and reinsurance above \$20,000 for 1992 claims (with 30% plan coinsurance)
- Model 8 - Partial capitation with Part B capitated and Part A capitated up to \$20,000, with capped risk corridor (50% risk-sharing up to  $\pm$  20%)
- Model 9 - Select and ultimate rates, with 20% reduction for persons enrolled less than 2 years, and pooling of base year (1990) claims above \$15,000 and reinsurance above \$15,000 for 1992 claims (with 30% plan coinsurance)
- Model 10 - Partial capitation with Part B capitated and Part A capitated up to \$10,000, with capped risk corridor (50% risk-sharing up to  $\pm$  20%)
- Model 11 - Blended rates, experience rating with both pooling of base year (1990) claims above \$5,000 and reinsurance above \$5,000 for 1992 claims
- Model 12 - Partial capitation, with Part B capitated and cost reimbursement for Part A services

is clearly superior to the other payment methods.

Model 5 (experience rating with a \$50,000 threshold for pooling of claims and reinsurance) is comparable to the AAPCC payment method for small groups of size 500 and 1,000. Model 5 is significantly better than the AAPCC for the larger group sizes. However, Model 4 with the 3-tier risk corridors is the most accurate model among those with close to 100 percent prospective payments.

For the models with 83-85 percent prospective payments (Models 6 - 8), Model 8 with partial capitation and a capped risk corridor is clearly superior. For all group sizes, the mean absolute value of error in estimated payments for Model 8 is approximately 50 percent of the error in estimated payments for Models 6 or 7.

For Models 9 and 10, with 74 percent prospective payments, Model 10 is clearly superior. Model 10 also is based on partial capitation with a capped risk corridor. For all statistics, Model 10 is stronger than Model 9 for the smaller group sizes and comparable for the larger group sizes.

The final two models, Model 11 and Model 12, have less than 50 percent prospective payments. Model 11 appears to be somewhat superior to Model 12. Model 11 is based on blended rates with experience rating and reinsurance.

In addition to mean absolute value of error in estimated payments, Table 6-2 also shows the results for the other statistical measures of accuracy and goodness-of-fit: mean absolute value of percent error in the predictive ratio, percent of groups with error less than 5 percent, percent of groups with error greater than 10 percent, product moment correlation, R-square, and mean square error as a percentage of mean prospective payment. The results for the other statistical measures followed the basic patterns for the first statistic, mean absolute value of error in estimated payments.

Of all of the different statistical measures, we believe that the last statistic, mean square error as a percentage of mean prospective payment, is perhaps the best overall measure of comparison (among the seven statistics produced by the simulation model) because it relates the mean square error of

each payment method to the average prospective payment that is made to the health plan. The retrospective portion of the payment is based on actual costs. Therefore, the overall accuracy of the payment method depends upon the degree of accuracy of the prospective portion of the total payment. Similar results for the different categories of payment models, by proportion of prospective payments, are indicated by mean square error as a percentage of mean prospective payment.

In summary, it appears that payment methods based on partial capitation with capped risk corridors are the most effective in terms of the accuracy and reliability of estimated payments compared to actual costs. These models are very good for both small groups and large groups of simulated HMO enrollments. In addition to capped risk corridors, the partial capitation models that were tested in this chapter employ reinsurance for Part A expenses above selected thresholds. However, we would expect similar successful results for partial capitation models using other combinations of capitated and non-capitated services. An advantage of the approach based on partial capitation with risk corridors is that it can be tailored easily to enrollment groups of different sizes and managed care organizations with different characteristics (i.e., age of plan, degree of experience serving Medicare eligibles, level of capitalization, etc.).

## Chapter 7

### Conclusions and Recommendations

The Medicare risk contracting program provides an opportunity for Medicare eligibles to obtain medical services from federally-approved HMOs and CMPs. This program has been in operation on a demonstration basis since 1980 and as a regular HCFA program since 1985. Currently, there are 3.2 million Medicare eligibles enrolled in 194 HMOs and CMPs with risk contracts. The number of HMO enrollees has grown steadily since 1985.

HMOs that participate in the Medicare risk contracting program are paid according to the Adjusted Average Per Capita Cost (AAPCC) payment methodology, which has been used since the beginning of the Medicare risk program. The AAPCC payment method is based on 95 percent of the estimated cost that Medicare HMO enrollees would have experienced if they had remained in the fee-for-service sector.

There has been substantial criticism of the AAPCC, and the limitations of the AAPCC payment method are well-known. The AAPCC explains less than one percent of the variance in per capita Medicare costs for aged beneficiaries.<sup>1</sup> From HCFA's perspective, the AAPCC is responsible for negative program savings because it does not compensate for the favorable selection of healthier-than-average persons being enrolled in HMOs.<sup>2</sup>

From the HMO industry perspective, the AAPCC is based on fee-for-service data and does not adequately reflect HMO practice patterns or cost experience. The inadequacy of the AAPCC payment method to accurately estimate the risk/cost of HMO enrollees has also had negative consequences, such as forcing many participating HMOs to discontinue their risk contracts due to financial

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<sup>1</sup> Louis F. Rossiter, Herng-Chia Chiu, and Sheau-Hwa Chen, "Strengths and Weaknesses of the AAPCC: When Does Risk Adjustment Become Cost Reimbursement?" in Harold S. Luft (editor), HMOs and the Elderly, Ann Arbor, MI: Health Administration Press, 1994.

<sup>2</sup> Jerrold Hill, Randall Brown, Dexter Chu, and Jeannette Bergeron, "The Impact of the Medicare Risk Program on the Use of Services and Cost to Medicare," Princeton, NJ: Mathematica Policy Research, December 1992.

losses that they experienced under the risk program. Other HMOs have been reluctant to enter the program because of the potential financial risk for which they would be liable due to AAPCC payment insufficiencies. Thus, many observers believe that the AAPCC is at least partly responsible for the lack of HMO participation (less than 40 percent of existing HMOs have Medicare risk contracts). In addition, the majority of HMO risk enrollment is concentrated in a few areas with relatively high AAPCCs (e.g., South Florida, Los Angeles).

In this chapter, we summarize the results of the study and present conclusions and recommendations based on the results. We also discuss the implications of proposed legislative changes for the Medicare program related to managed care organizations (MCOs) and rate-setting requirements.

The purpose of this study was to evaluate four alternative payment methods for risk HMOs: (1) partial capitation, (2) reinsurance, (3) select and ultimate rates, and (4) experience rating. In addition, blended rate methods that combine one of the payment methods above and fee-for-service reimbursement (or two or more of the above methods) were also investigated. In the previous chapters of this report, alternative payment methods that are applicable to both risk HMOs and other forms of MCOs have been identified and evaluated. The accuracy, reliability, and appropriateness of the alternative methods have been compared, with discussion of the strengths and weaknesses of each method.

#### 7.1 Partial Capitation Models with Risk Corridors

In Chapter 2, we investigated a variety of different partial capitation models, including risk corridors. It appeared that several of the partial capitation and risk corridor models were quite successful in limiting the amount of financial risk that must be borne by health plans, especially for plans with smaller Medicare enrollments (e.g., less than 5,000 enrollees).

The phrase "partial capitation" refers to any payment method in which part of the payment depends on a predetermined capitation rate (prospective payment rate) to health plans, and the rest of the payment is determined in

some other manner. Most forms of partial capitation require establishing both (i) the prospective payment rate (e.g., a uniform government offer price or a price established through competitive bidding), and (ii) a measure of plan costs, which may be based directly or indirectly on actual plan expenditures or on a proxy for them. The measure of plan cost can be based on: (1) actual plan costs related to Medicare beneficiaries, (2) an indirect estimate of those costs (e.g., the "adjusted community rate"), or (3) a proxy for plan expenditures (e.g., actual utilization of Medicare enrollees priced at Medicare fee-for-service rates). The prospective payment rate in the current Medicare risk contracts is 95 percent of the AAPCC for the enrollees of the health plan.

#### Advantages and Disadvantages of Partial Capitation and Risk Corridors

Perhaps the simplest approach to partial capitation is a risk corridor based partially on the prospective payment rate and partially on the actual expenditures for Medicare enrollees. For example, the health plan could receive a percentage of the full-risk prospective capitation rate and the complement (100 percent minus that percentage) times the actual cost per capita for Medicare enrollees. A risk corridor can be capped or uncapped. If capped, the maximum potential loss for a health plan equals the upper limit of the risk corridor minus the prospective payment rate, and the maximum potential profit equals the prospective payment rate minus the lower limit of the risk corridor. If uncapped, the health plan pays 100 percent of any costs beyond the high end of the corridor, and keeps 100 percent of the profits for costs below the low end.

Compared to other partial capitation methods, the risk corridor has the primary advantages of simplicity (and hence ease of public explanation) and the capacity to set the degree of risk (and hence the financial incentives to operate efficiently) over a wide range of possible cost outcomes. Simplicity is important both to obtain initial approval and to gain public acceptance, especially when large profits may be reported for some plans. Simplicity and

public confidence of the fairness of the system may also assist in warding off Congressional manipulation to meet budget objectives.

Risk corridors are particularly effective as a way to vary the degree of risk and to concentrate it where it is believed to be most effective. For example, the portion of risk shared can be set to provide an intense risk incentive over a short range or a much lower level of risk over a wide range. It is also easy to add steps with reduced degree of risk (e.g., risk shared 50% / 50% for  $\pm 10\%$ , and 25% / 75% between  $\pm 10\%$  and  $\pm 20\%$ , etc.). Such steps permit making the incentives stronger for the range of cost outcomes believed to be most likely, e.g., near the prospective payment rate. Thus, the incentive can be concentrated where it should be most effective for the majority of health plans, while maintaining some incentive for plans experiencing less likely cost outcomes. Similarly, the degree of risk can be varied directly with the expected probability of the cost outcome.

The flexibility to set the degree of risk allows for any balance between financial incentives and solvency protection that is desired. The flexibility to determine the incidence of risk allows for distributing the risk retained by a health plan over those cost outcomes where the incentive is believed to be most effective. The risk corridor approach can also be effective in limiting the risk of catastrophic experience in the event of an epidemic or other unforeseen circumstances and in limiting the risk for new plans.

There is another, more subtle advantage, of the risk corridor approach to partial capitation. The potential reduction in federal outlays produced by manipulating the terms of the agreement (i.e., lowering the definitions of the plan cost or the prospective payment rate), is cut in proportion to the percentage of profits or losses shared by the federal government. Thus, if the percentage shared is 50 percent, the reduction in projected federal outlays obtained by reducing the prospective payment rate (or more likely, failing to increase it to match the increase in cost to provide benefits) is also reduced in half, reducing the temptation to manipulate the terms of the agreement. In particular, a freeze on all payment rates would only reduce the

rate of reimbursement by half of the impact of full-risk contracts.

A major disadvantage of an uncapped risk corridor option is that the health plan is fully responsible for any cost beyond the risk corridor. This presents two difficulties for health plans.

First, without a cap, a health plan cannot assure its sponsors (or other financial backers) or regulators that it will not incur some unacceptable level of losses because there is no maximum on possible plan losses. This presents a problem for some plan sponsors or their financial backers, especially for new plans. An uncapped risk corridor also presents a problem for regulators to set adequate capital standards, which could result in capital requirements that are significantly higher, thereby discouraging some new plans or limiting their potential enrollments.

Second, for practical reasons, the expected losses for cost outcomes above the high end of the risk corridor are greater than the expected profits for outcomes below the low end of the risk corridor in most areas of the U.S. There are several reasons why this tends to be the case. The most important factors are the following:

- (1) The Medicare payment rate, at 95 percent of the AAPCC, is already quite low in most counties of the U.S. compared to the cost of any private health plan. Among the reasons are the very low administrative costs of Medicare (only a fraction of which are included in the Medicare payment rate), the five percent reduction in the AAPCC, and the well-known problems of the accuracy of the geographic adjustments.
- (2) Medicare fee-for-service payment rates are relatively low for most services in most counties of the U.S., reflecting the low payment rates that a buyer with the market power of the Federal Government can obtain. In order for a health plan to operate with a cost below the AAPCC payment rate, the plan must achieve significant savings in the level or mix of services provided. Thus, one of the largest sources of the savings of managed care plans, lower payment rates, is not available.
- (3) The probabilities of unexpected events that can drive up costs tend to be much greater than those that can reduce costs. In other words, there tend to be many more things that can go wrong unexpectedly, increasing costs, than can happen to unexpectedly reduce costs, and the potential losses from catastrophic events can be much greater in magnitude.

In mathematical terms, the expected value of losses (due to costs greater than the high end of the risk corridor) is substantially more than the expected



value of gains (due to costs less than the low end of the risk corridor).

Thus, from both public and private perspectives, the risk corridor approach serves best as a method of reducing risk for new health plans, reducing capital needs, providing protection against a bad year, reducing temptation for Congressional manipulation, and avoiding public criticism for apparently windfall profits. It also reduces potentially perverse incentives to health plans at a time when risk adjustment and outcomes measurement methods are still being refined. But full health plan responsibility outside the risk corridor reduces the protection against catastrophic events and, in the case of new plans and innovative plan designs, against the unknown. An uncapped risk corridor is also unfair on an expected value basis, as noted above.

#### Capped Risk Corridors

The addition of the cap overcomes two of the disadvantages noted for uncapped risk corridors. The most important change is that the total financial exposure of the health plan can be strictly limited either on a per member per month basis or in total dollar amount by also limiting enrollment.

The capacity to set a limit on the total dollar amount of losses could induce many conservative organizations to take a chance on risk contracting that would otherwise shun unlimited risk. Participation may also be facilitated by the attitude of sponsors and institutional lenders. Limits on the total potential losses over several years would further reassure sponsors and lenders.

Limiting the total amount of annual losses will also protect plans against epidemics or other factors that could produce excessive costs in any particular year, or fluctuations in the number of very expensive conditions that occur among a plan's enrollment in any year. Also, there would be much less exposure of plans to the risk of becoming so strapped for funds that adequate services simply cannot be afforded.

In addition, for the reasons given above, the unsymmetrical sharing of

gains and loss is made fairer. The risk corridor is still asymmetrical, however, with the expected value of losses somewhat greater than the expected value of gains.

Capping profits and losses has the further advantage that very large profits would be eliminated. Very large profits are more likely to result from favorable selection or other advantages achieved by gaming the system than from efficient health care. There could thus be no anecdotal examples of windfall profits that could be used to discredit the system or to serve as an excuse to reduce the payment level.

These advantages would be achieved without any major disadvantage. As noted, even the most profitable plans would probably be better off in the long run if profits are limited to some level that appears acceptable to the public.

## 7.2 Reinsurance Models

Both reinsurance and outlier payment models were investigated, with HCFA serving as the reinsurer. Continuation tables were used to estimate the impact of catastrophic medical expenses in a number of different scenarios. Reinsurance options were investigated for: (1) total medical expenses, and (2) inpatient hospital expenses only.

Our analysis demonstrates that reinsurance and outlier payments are effective in providing protection to health plans against the risk of high-cost cases and catastrophic expenses, which is a very significant factor for a health plan providing health services to Medicare eligibles. Reinsurance tables were also calculated for the HMO Outlier Payment Demonstration and the Medicare Choices Demonstration.

### Advantages and Disadvantages of Reinsurance

The primary advantages of reinsurance are: (1) to remove an important source of fluctuations in the cost to health plans to provide care, and (2) to provide protection against catastrophic claims that could exhaust the

financial resources of the plans.

Reinsurance provides as much protection as some health plans really need, especially those that capitate most outpatient services with provider organizations. It may also provide all of the risk limitation assistance needed or desired by health plans based on multi-specialty physician groups that pay a high proportion of total income in the form of profit-sharing bonuses, and thus are in a position to absorb relatively large losses on professional services. Many such groups, however, may prefer the additional protection of risk corridors, especially if a high proportion of patients are under capitation arrangements.

Reinsurance, as described here, is based on an actuarially fair premium. It would not change the expected loss or gain, but only minimizes fluctuations from catastrophic claims. It does, however, provide more protection to the less efficient health plans, since the reinsurance payments will also be higher than implied by the average payment rate.

By itself, reinsurance does not effectively limit a health plan's losses except those occasioned by catastrophic claims. Relatively large health plan losses can occur without many catastrophic claims, especially if the level of operating expenses of a health plan proves to be higher than the level of the payment rate. Thus, a plan sponsor or regulator will not have the assurance of a preset maximum possible loss.

From a public policy perspective, the primary disadvantage of reinsurance is to dampen the financial incentives for health plan managers to control the cost of very expensive cases once the threshold has been reached. This problem can be overcome by not reinsuring all of the costs, but leaving some "coinsurance" that the plan must pay. Even a 10 percent coinsurance rate can accumulate very large amounts in catastrophic claims.

There are further advantages and disadvantages to be considered in the form of the reinsurance and the scope of the services covered. One approach that is simple conceptually is to limit the scope to inpatient facility costs. This approach simplifies administration, especially in the absence of the need

to measure plan costs for other services. A main reason that many private reinsurance policies are limited to inpatient hospital services is to simplify the claim determination problem.

A broader scope of reinsured services, however, would provide more financial protection against catastrophic claims. Further, if reinsurance is combined with a partial capitation risk corridor, measures of plan cost must be available that can be used to determine the reinsured expenses.

Whether there should ever be a maximum on the expenses for which a health plan is responsible for any patient depends on other elements of the program as well as the question of incentives. Maximums are usually set high enough that relatively few patients reach them, and it is possible to review the services provided to such patients closely through utilization review techniques. Another alternative is for HCFA itself to assume responsibility for such patients or assign them to a special contractor skilled in case management. The question of incentives to continue managing care effectively is also qualitatively different if the scope of services reinsured is limited to those for hospital stays or incurred for a particular diagnosis or an episode of care.

### 7.3 Select and Ultimate Rates

The analysis conducted for this study demonstrated that there can be severe selection effects (favorable and adverse) for groups of Medicare enrollees, especially in the first 2 - 3 years of enrollment in an HMO. The analysis of select and ultimate rates indicated that rate adjustments for the initial 2 - 3 years of enrollment in an HMO, based on selected characteristics of the enrollees, can help to mitigate the adverse consequences of severe selection effects.

#### Advantages and Disadvantages of Select and Ultimate Rates

The primary advantage of using select and ultimate rates is to counteract the initial selection effects of Medicare eligibles who enroll in

HMOs. As demonstrated by the selection studies conducted by Mathematica Policy Research, most HMOs experience favorable selection from new enrollees. Persons who are willing to switch to a new health plan are usually healthier-than-average, compared to a random group of Medicare eligibles in their AAPCC demographic group (by age, gender, Medicaid status, institutional status, and working aged status). Thus, rate adjustments based on select and ultimate rates have the potential to take into account the effects of biased selection resulting from new enrollees in HMOs.

There are two disadvantages associated with the use of select and ultimate rates. First, the rate-setting method becomes more complicated, and it is necessary to incorporate additional data requirements into the rate-setting process. The approaches described in Chapter 4, however, all use data that are readily available from claims and administrative data files. Second, as discussed above, although the accuracy of payments is substantially improved, adjustments using select and ultimate rates can explain only part of the variation in medical costs for new enrollees. A significant portion of the variance is due to random variation in medical costs.

#### 7.4 Experience Rating

Experience rating is the principle method used by private insurers to set premium rates for employer-sponsored groups. However, payment models using experience rating had great difficulty in accurately predicting future costs for smaller groups of Medicare eligibles. For most of the experience rating models that were tested, the level of accuracy was comparable to the level of accuracy of the AAPCC payment method (for groups of Medicare eligibles with less than 5,000 persons). Analysis indicated that the relatively low level of accuracy resulted from the difficulty in predicting deaths, changes in open groups, and the frequency and severity of high-cost cases in the Medicare population. In addition, information lags require a two-year period for projection of historical costs for experience rating (e.g., from 1990 to the projected year 1992).

Although the initial set of experience rating models did not perform well in predicting actual 1992 costs for smaller groups, other models with various refinements were investigated. A modification of the basic experience rating model that included both pooling of base year claims and reinsurance coverage in the projected year greatly increased the accuracy in predicting actual costs. The robustness of the results for this model using both data sources indicates that this is a strong model that warrants further attention.

#### Advantages and Disadvantages of Experience Rating

The primary advantage of experience rating is that it is perhaps the most accurate and reliable type of rate-setting system. It has been used extensively by private health insurers and by OPM for the Federal Employees Health Benefits Program. Most HMOs use experience rating in some form for large employment groups. Thus, it is a tested and accepted rate-setting method. In addition, it appears that it would be difficult for any risk adjustment system to have greater accuracy or reliability than an experience rating system, assuming the same proportion of prospective and retrospective payments in each system.

The disadvantages of experience rating include: (1) the inherent difficulty of using experience rating for the Medicare population, and (2) concerns regarding incentives for cost containment under an experience rating system. The distribution of Medicare expenditures is extremely skewed. At one end of the distribution, approximately 20 percent of Medicare beneficiaries report zero expenditures in a given year. At the other end of the distribution, there is a high frequency of catastrophic cases. In addition to other factors, the difficulty in developing a Medicare experience rating system is due to the highly unpredictable nature of many of the catastrophic cases. However, as discussed in Chapter 5, it appears that a good experience rating system could be developed by incorporating a combination of prospective and retrospective reimbursement approaches.

The second disadvantage involves the incentives for cost containment

under an experience rating system. With retrospective experience rating, the health plan is eventually reimbursed for all costs incurred in providing care to the enrolled population. Thus, the full-reimbursement approach is similar to the current fee-for-service system with the associated lack of incentives for cost containment. However, if prospective experience rating methods are used, the health plan can be fully at-risk with prospectively-determined capitation rates (that reflect the prior cost experience of the enrolled population). Although it appears that an experience rating system for Medicare would require some elements of retrospective reimbursement as discussed above, some experience rating models would preserve the incentives to contain costs on the part of the health plan (e.g., as demonstrated by some of the models using prospective rates and reinsurance (with plan coinsurance) in Chapter 5).

#### 7.5 Blended Rate Methods

Blended rate models that utilize two or more of the rate-setting techniques discussed above were also evaluated. It appears that the most promising models incorporate features related to both prospective and retrospective reimbursement techniques and also features related to risk sharing between HCFA and the participating health plans.

#### Advantages and Disadvantages of Blended Rates

The primary advantages of blended risk and fee-for-service capitation rates are as follows:

- Does not require determining actual plan costs.
- Payment is independent of the unit cost to most health plans to provide services, thus preserving the incentive to reduce the average unit costs of services on the portion of the payment not based on capitation.
- Flexible, in that any degree of desired risk sharing is feasible.
- Should increase the payment level in areas with low AAPCCs and reduce them in areas with high AAPCCs.

Blended capitation rates also have disadvantages compared to other forms

of partial capitation. These disadvantages can be summarized as follows:

- Requires collecting and auditing detailed episode and procedure information from capitated providers and clinics, thus increasing administration costs and the administrative burden on providers. (If some utilization is not reported, the health plans will be penalized by half of the unreported utilization.)
- May provide perverse incentives to increase nominal utilization (e.g., office visits to multi-specialty clinics if the marginal fee-for-service payment is higher than the marginal cost to provide services).
- Introducing fee-for-service into the payment method could prove confusing to the public and to Congress, and hence difficult to defend.
- Provides no protection against Congressional reductions in fee levels (for the fee-for-service Medicare program), which could result in a gradual eroding of the fee-for-service component of payment.

#### 7.6 Other Factors to be Considered for Medicare Payments to HMOs

In addition to selection of the appropriate payment method, there are a variety of other factors that need to be considered for Medicare payments to HMOs and other health plans. Three of these factors will be discussed in this section: (1) phasing in of risk sharing, (2) voluntary choices of options, and (3) the proportion of prospective versus retrospective payments.

##### Phasing in of Risk Sharing

The primary advantage to potential health plans of some type of phasing in of risk sharing is to greatly reduce the potential losses that can be incurred before there is actual cost experience that can be relied on in preparing forecasts. Similarly, capital needs would be reduced in the first few years of program participation, which should lead to more risk-averse organizations being willing to participate.

From the perspective of the Government, there should be greater participation, especially in areas in which there are currently very few risk contracts. Similarly, there should be greater readiness to try innovative and unproven features, which could lead to new models that have cost advantages.

An additional advantage to the Government is that the incentive payments



to the risk con factors (i.e., profits) during the first years operation would be reduced. Since there are many imperfections in the current state-of-the-art of setting the government payment rates and no method has been developed to fully counter the biased selection that occurs naturally, the financial success or failure of health plans with risk contracts reflects selection and luck as well as operating efficiency. Although studies have shown that many health plans benefit from favorable selection in their initial Medicare enrollments, the average experience among new cohorts of enrollees reverts to the expected average of all beneficiaries over several years. Thus, the Medicare payments for windfall gains should be reduced.

A disadvantage for the Government, however, is that plans could use the first two years to determine if they will be able to operate at a profit and withdraw if the experience indicates otherwise. Phasing in the amount of risk allows the plans to determine early on if they are likely to at least break even. Those that project profitable operations would be expected to continue and those that project losses would be expected to drop out. Further, health plan sponsors would benefit from the lower level of risk without a significant increase in plan level antiselection against the Medicare program, since (i) profits of plans that find that they can operate successfully will also be reduced, (ii) the lower level of risk should attract more plans with marginal prospects, and (iii) windfall profits from a favorable initial selection will be reduced.

#### Voluntary Choices of Options and Risk Selection of Plans

A new health plan could be permitted to choose among all of the options described above (and perhaps additional options that extend the same concepts). Once an option had been selected, however, the health plan would be bound indefinitely by the option selected.

The primary advantage to sponsors of a choice of the level of risk is that each plan can choose the option that provides the level and incidence of risk most acceptable for its sponsors and that fits its enrollment plans best.

The public should benefit as well, since the number of plans offered should be much greater, through greater competition and more innovation. In addition, to the extent that it is national policy to enroll the maximum number of Medicare beneficiaries in prepaid managed care organizations, more choices should mean a larger aggregate enrollment. In addition, the ability to select a lower risk threshold should encourage plans in areas where there appear to be major problems with the accuracy of the AAPCC.

There are no obvious disadvantages to plan sponsors other than perhaps that there will be greater competition. There may be some financial disadvantage to the Medicare program, however, from higher payments to health plans that fail to keep the average cost per capita below the prospective payment rate, especially the plans that would not otherwise have taken the risk. This is because the opportunities for health plans to select against the program will be increased, and the price of finding out if a plan can operate profitably will be reduced.

Biased selection under the current Medicare risk contracts takes place at two levels.

- Some forms of managed care organizations tend to enroll beneficiaries that are less expensive to provide medical care for than the average for their gender, age-group, Medicaid status, institutional status, and county of residence. 95 percent of the AAPCC for such enrollments is higher than would be paid under the Medicare fee-for-service program.
- Biased selection can also occur among health plans. Those plans that know they can attract lower-cost enrollees (relative to their AAPCC cells) are more likely to apply for risk contracts than those plans that have reason to believe they can not attract such enrollees. In addition, those plans that offer risk contracts and subsequently find that it is not profitable are likely to drop out of the risk program. As a result, it is possible that the majority of plans participating in the program are those plans which have experienced favorable selection.

There are many opportunities for health plans to influence the relative cost of persons who enroll, or to encourage those who develop high-cost conditions to disenroll. The most effective means is to limit access to physicians or facilities that persons in poor health may want to access. Health plans can also devise additional benefits and copayments that appeal to the desired types of enrollees.

Perhaps the greatest opportunity to maintain a favorable selection of enrollees, however, is to encourage those with expensive health conditions to disenroll. Medicare risk plan enrollees are permitted to disenroll effective on the first of the next month. This is an open invitation for subtle approaches to encourage the most expensive enrollees to depart.

The capacity and opportunities for health plans to select against the program (i.e., the first type of selection noted above) depends on (i) the absence of an effective risk adjustment system, and (ii) the continuous disenrollment option for beneficiaries. These opportunities are not changed by offering more choices of risk arrangements. However, the opportunities for plan-level selection are increased, and the cost to a plan to discover whether it will be profitable or not under a risk system is reduced. Plan sponsors that are certain of operating profitably will always select the highest level of risk. But those with grounds to fear that they will at best break even will always select the lowest risk level. Further, Medicare must pay costs that could be higher than the cost of the fee-for-service Medicare program. Nevertheless, the extent of this plan-level selection can not be higher than under the present risk contracting arrangement, in which only those sure of profit will offer risk contracts and those that would not or are unsure do not offer them.

The prospects for plan-level selection requires attention to the potential ways in which it could occur, and to establish rules that minimize the cost to the program consistent with preserving its advantages in attracting more plans. For example, plans could be required to select in advance from a specific menu of choices of payment options and to continue under this choice indefinitely. Additional rules would have to be devised and implemented that effectively prevent sponsors from opening competitive plans under a more profitable risk-sharing option and either discontinuing or de-emphasizing an older health plan. A simple such rule would be that all health plans controlled by the same sponsor would have to choose the same risk option. A possible variant of this option would be to permit choices of the

initial risk level, but require a designated arrangement over time (which could be a form of partial capitation or a full-risk arrangement).

#### The Proportion of Prospective versus Retrospective Payments

In a totally prospective payment system, health plans are fully at risk for providing health care services with the capitation revenue that they receive. In a totally retrospective payment system, all costs incurred by the health plan will be reimbursed. Although prospective systems incorporate the desired incentives for cost containment, most observers believe that it will be extremely difficult, if not impossible, to develop a totally prospective payment system that is appropriate for Medicare health plans. The disadvantages of a totally retrospective system have been discussed previously.

Thus, the goal is to develop a payment system that incorporates the correct balance between prospectively-determined payments and retrospectively-determined payments for each participating health plan. Many examples of payment methods were discussed in this report that ranged from 36 percent to 100 percent prospective payments. However, the characteristics of each health plan participating in Medicare on a full-risk or partial-risk basis also need to be considered. For established HMOs with a history of serving a large Medicare enrollment, the payments should probably be very close to 100 percent prospective (possibly with a small amount of reinsurance or risk sharing). For a small health plan with minimal Medicare experience, the appropriate payments may be 50 percent prospective and 50 percent retrospective.

#### 7.7 The Impact of Proposed Legislative Changes on HCFA Rate-setting Requirements for Managed Care Organizations

The Medicare program is facing perhaps the most sweeping changes since its inception in 1965. It is likely that final legislation passed later in 1995 will include major changes to the existing Medicare program.

A variety of managed care initiatives have been proposed in the pending legislation or in HCFA demonstration projects. The managed care initiatives

have focused on generating cost savings by using managed care plans to increase the degree of utilization management for Medicare enrollees and to take advantage of other cost containment mechanisms utilized by managed care plans (i.e., capitation of providers, delivering care in the lowest-cost setting, primary care gatekeepers, provider network management, economic incentives and risk-sharing arrangements, etc.). Features of proposals have included: permitting a wide variety of managed care organizations to contract with HCFA for Medicare enrollees, provision of reinsurance coverage with HCFA acting as reinsurer, allowing alternative payment methods and risk-sharing arrangements for managed care organizations, and use of competitive bidding and competitive pricing approaches.

#### New Forms of Managed Care Organizations

In its present form, the proposed legislation will open up the Medicare program to a much wider range of managed care organizations, compared to the current Medicare risk contracting program with HMOs. If the proposed legislation is passed in close to its current form, it will be necessary for HCFA to develop new payment methods that are appropriate for the broader range of managed care organizations.

Under proposed legislation, the new forms of managed care organizations that will be permitted to participate in Medicare on a risk or partial risk basis include: (1) plans based on independent preferred provider organizations (PPOs), (2) managed care organizations with point-of-service (POS) plans, (3) plans based on primary care case management organizations, and (4) plans based on provider service networks (PSNs), physician-hospital organizations (PHOs) or other integrated delivery systems (IDSs). Offering of new plans would be facilitated by three important provisions in the proposed legislation: (i) provider service networks (PSNs), (ii) by effective repeal of a number of the current requirements for offering risk contracts, especially the maximum of 50 percent for Medicare and Medicaid enrollments and freedom from certain anti-trust concerns, and (iii) provisions to change the

geographic factor in determining the AAPCC.

The new options are likely to attract plans offered by a large number of very different organizations than now have risk contracts. Some of these have already been successful in the private market place, but cannot meet the risk contract requirements, especially that 50 percent of the enrollment in the same plan be private. Others do not meet the organizational requirements, such as the limitation to the services of contracted providers. There would be an additional incentive to offer low-cost networks and rewards to biased selection if rebates are allowed. We will comment briefly on the implications to HCFA of contracting with several of these new forms of MCOs.

#### PPOs

Preferred provider plans have become popular over the last decade with larger employers. Most independent PPOs (not allied with an HMO), however, are offered on a fee-for-service basis, with financial incentives based on overall cost at most a minor consideration. The primary competitive tool of PPOs has been discounts from normal charges. In recent years, however, some PPOs have appeared in which the physicians have been selected on the basis of their utilization profiles (i.e., those that perform tests, refer to specialists and/or admit to hospitals less often). Financial incentives and utilization review have tended to have relatively small impacts on utilization.

Some PPOs may offer Medicare plans. As long as the continued Medicare fee-for-service program continues to be a viable option (i.e., fee levels do not fall so low that most physicians refuse to accept Medicare patients), however, the scope for discounts will necessarily be limited and competitiveness would have to be based on the selection of panels and perhaps a new emphasis on financial incentives and utilization controls.

#### Point-of-Service Options

Point-of-service plans can be offered by HMOs, private insurers, and

other forms of MCOs. As a practical matter, the primary difference between point-of-service options offered by an HMO and plans offering PPOs is that the HMO almost always uses the same network for a POS option as for an exclusive provider HMO option. Thus, there are other relationships between the HMO and the network providers that affect utilization.

The primary competitive advantages of HMO POS plans have been (i) very low payments for out-of-network services (typically resulting in much higher balance billing than enrollees expected), and (ii) some plans carve out expensive services (for which there is no choice of provider), especially mental health and substance abuse. Many POS options offered by HMOs require the same level of authorization for admissions to hospitals for physicians not in their networks as for their network physicians. Some require approval by the gatekeepers for all non-emergency out-of-network services (i.e., the choice is only of which specialist, not whether there is a referral). These utilization controls can be very effective. In addition, a few have persuaded providers to accept very strong financial incentives, such as paying the network providers capitations that must cover the out-of-network referrals as well as direct services.

#### Primary Care Case Management Organizations

The relaxed requirements of the proposed legislation could lead to full risk "provider service network" plans (PSNs) based on primary care case management organizations. Under current law, these organizations may be discouraged by the capital and start-up costs associated with forming an HMO, as well as the substantial financial risk. Those with most of the primary care physicians in any area may be dissuaded by anti-trust concerns. The new legislation would allow relatively loosely organized and thinly capitalized plans to emerge, at little financial risk to the owners.

#### Physician-Hospital Organizations (PHOs) and Integrated Delivery Systems

A number of networks have been founded by hospitals and the physicians

with admission privileges. Most of these are PPOs, but some have gone further to organize so as to receive a capitation payment for non-emergency, in-area health care within the catchment area of the hospital.

These PHOs vary greatly in design and financial arrangements. The objective of many PHOs appears to be more to offer a negotiating framework for a hospital and the physicians on its medical staff to negotiate with HMOs, rather than to offer a plan directly to consumers. With the anti-trust protection and other relaxed requirements of the bill (e.g., no 50 percent rule), however, those organized primarily to protect their markets could offer the plan directly to Medicare beneficiaries, rather than market through HMOs.

As noted, the above organizations can have quite different characteristics and operating features, especially compared to the requirements for HMOs and CMPs to participate in the current Medicare risk contracting program. In the remainder of this chapter, we discuss three key issues for the new managed care organizations (i.e., PPOs, PCCMs, IDs, and PSNs): (1) rate-setting and payment issues, (2) financial solvency concerns, and (3) HCFA cost savings.

#### Rate-setting and Payment Issues

The results of this study indicate that there are several rate-setting methods and payment models that can be used to improve HCFA payment to risk HMOs and other managed care organizations (MCOs). At a group level, the current AAPCC methodology is a modestly effective payment method. It is not particularly accurate in predicting actual costs. However, it does produce baseline average payment rates that appear to be reasonable estimates of local fee-for-service costs in most cases. The benefits of improved payment methods would be: (1) improved fairness in payments to MCOs, leading to more MCOs being willing to offer coverage to Medicare enrollees, and (2) improved accuracy in payments to MCOs, leading to more savings for HCFA by reducing selection opportunities. These dual impacts (more MCOs participating with more savings to HCFA) become all the more important since the Medicare program



is facing major changes involving MCOs, as described above.

The impact of the proposed new options in Medicare depend crucially on how the AAPCC is revised and whether risk adjustment is incorporated and how it is monitored. The proposed legislation directs HCFA to use larger areas for geographic factors, and there are rumors of requirements to raise the AAPCC in rural areas substantially. At present, risk contract enrollees are highly concentrated in relatively few areas with high AAPCCs. Changes in the geographic factors can have a profound impact on opportunities for health plans. There are corresponding problems for HCFA to measure, evaluate and counter biased selection. In particular, much higher AAPCCs for rural areas could lead to local monopolies based on a PSN formed from the local hospital and virtually all active primary care physicians.

Risk sharing could change the role of the Adjusted Community Rate (ACR), especially if payment is based partly on the AAPCC and partly on the ACR. The ACR is currently only used as an instrument of price control, i.e., to determine a maximum acceptable profit to the risk contractors. Since HMO administrative costs are usually not proportional to medical costs, the ACR sets a maximum substantially higher than most HMOs seek per Medicare member. In addition, there are other opportunities to game ACRs, especially in the early years of a risk contract.

#### Financial Solvency Concerns

Ensuring the financial solvency of new plans that enroll Medicare eligibles on a full-risk or partial-risk basis raises many concerns. Potential problems include plan bankruptcies, patients not receiving required services, substantial disruption of the program, impaired quality of care, and negative publicity for the program. In a worst case scenario, 10-20 percent of new plans might either go bankrupt or encounter severe financial problems that threaten the continued delivery of care.

The minimal capital standards and relatively few other organizational requirements for new health plans raise a host of solvency issues for HCFA.

Each decade appears to bring a revival of the notion that the formation of new health plans should not be impeded by capital requirements. Apparently forgotten is the experience at the beginning of the HMO movement in the 1970's, when many HMOs failed, and the later 1980's, when many HMOs that capitated IPAs that then paid physicians on a fee-for-service basis failed. The historical lessons should be clear: inattention to solvency questions will lead to numerous failures of new plans with perhaps a few million dollars in the bank, and several times as many unpaid bills.

Perhaps the most interesting question is which parties will prove to be most at risk for the losses of failed health plans. The language in the final bill will determine the potential regulatory authority of HCFA and state insurance departments. At this point, it is not even clear that patients can be protected from bills that are unpaid as a result of failure of a health plan. The most likely losers, however, are physicians and hospitals. There may also be bankruptcies of providers, especially hospitals with emergency rooms and clinics that traditionally serve low-income patients. Some providers may be unable to continue for financial reasons that are unrelated to their capacity to provide medical services efficiently.

To determine who is at risk and the likelihood that a plan failure would leave them with substantial unpaid bills depends on the details of the financial arrangements among the parties: the health plan management, primary care physicians, capitated specialists, other specialists, hospitals and free-standing facilities.

The form in which assets are held is also important. For example, a bank account and collection of promissory notes from network providers offer different degrees of protection. A major problem with failing insurers has been that the assets that regulators had counted on were not worth their stated values. Regulation is needed not only for the amount of capital, but its form as well.

There are many types of regulatory provisions that can be designed to counter the specific threats. For example, health plans could be required to

maintain liquid assets specifically earmarked for payment of emergency room care and out-of-area services.

#### Structure of Risk Sharing

The high probability of many failing health plans under full-risk arrangements suggests attention should be paid to payment methods that reduce the risk to the plans and that limit the losses if they fail. The potential losses of health plans can be reduced through a variety of approaches to risk sharing, including:

- Partial capitation (with the portion not at risk based on either costs or FFS payment rates)
- Capped risk corridors
- Individual stop-loss reinsurance (or outlier pools)

Risk sharing can also be phased in over time, with the plan share of risk limited to initial capital for the first 18 to 24 months. (It takes several months for all expenses to be reported and analyzed, and more time to decide on corrective action.)

The most important observations about the potential for risk sharing to reduce plan failures are that the incentives for operating a health plan efficiently are not changed, but only the weight of the consequences, provided that there are outside financial sponsors at risk. Excluding situations in which provider owners can overpay themselves (thus inflating nominal losses), financial sponsors will not willingly incur losses of any size, or continue in operation if profitable operations are not forecast. Risk sharing does require attention to the problems of establishing the actual level of losses of health plans, i.e., net of any overpayment to provider owners.

#### HCFA Cost Savings

One goal of the proposed legislation is to produce cost savings for the Medicare program through greater use of managed care organizations. However, measurement of HCFA cost savings resulting from managed care may prove to be difficult. Potential problems include: biased selection not accounted for by

the payment method; higher administrative costs and profit rates for new plans; and the impact of the fragmentation of the Medicare risk pool with the new MCOs, medical savings accounts, private-sector vouchers, etc.

Biased selection was found to be a substantial overall problem with the risk contracts that were in force prior to 1989.<sup>3</sup> The cost of selection may have increased over the last few years, for the reasons cited below.

In recent years many HMOs have canceled risk contracts, apparently because they were not able to operate profitably within the AAPCC income, many despite being very successful in the private market. Most of the canceled plan enrollment was in areas that did not have high AAPCCs.

Further, the enrollment in plans canceling risk contracts has been more than replaced by rapid growth in plans in areas with high AAPCCs, especially plans that either naturally or by design appear to benefit from favorable selection, e.g., less than representative physician networks, avoiding benefits that appeal to anyone with chronic illness, and offering a zero supplemental premium. Further, Medicare beneficiaries in good health can take advantage of these extras without the risk of losing more than temporary access to any specialist they might want, since they can disenroll at any time. As the enrollment has become concentrated in these zero premium plans in high AAPCC areas, it would be surprising if the cost to the Medicare program has not increased accordingly.

However, it may also be possible that the extent of selection differences between HMO enrollees and fee-for-service eligibles has been reduced since 1989. For example, the Group Health Association of America (GHAA), based on analysis of data from a 1994 survey conducted by National Research Corporation, concluded that Medicare eligibles enrolled in HMOs and in fee-for-service Medicare are very similar in terms of overall self-reported health status and the incidence of chronic medical conditions (arthritis,

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<sup>3</sup> Jerrold W. Hill and Randall S. Brown, "Biased Selection in the TEFRA HMO/CMP Program," Princeton, NJ: Mathematica Policy Research, September 1990.

asthma, diabetes, heart condition, high blood pressure). The percentage in both populations reporting "poor" health was the same (13.6 percent), and 16.7 percent of HMO members reported that they were in "excellent" or "very good" health, compared to 16.5 percent of fee-for-service eligibles. GHAA contends that the Mathematica Policy Research study indicating favorable selection was based on persons enrolled in HMOs in 1987 or 1988, and that there are no longer significant differences in health status between HMO and fee-for-service populations based on the 1994 survey data.

The proposed legislation would further encourage the kind of plan that now offers zero premium supplemental coverage and also open up a number of new opportunities for biased selection. The most obvious are the medical savings accounts, which in the absence of risk adjustment would appeal most to those who believe that the chance of needing health care in the next 15 months after enrollment is very low.

Some of the HMOs now offering zero premium plans are likely to switch to rebate plans, since these will appeal more to those in good health, and avoid appealing to those beneficiaries anticipating any medical problems. Many of those purchasing zero premium plans may be comforted by the low cost sharing, and may not be interested in rebate plans.

Other opportunistic health plans are likely to appear. The relaxed organizational and capital requirements are almost certain to attract some clever entrepreneurs that recognize the profit potential of selection opportunities and design plans that will appeal to persons with lower health care needs than the average for their AAPCC rate cells. The low capital requirements permit such plans to explore opportunities with very little risk of losses to the owners. Biased selection at the plan level will weed out those new plans that do not prove effective at attracting healthier enrollees and leave those that are effective, just as a decade of risk contracting led to the emergence of the current zero premium plans.

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<sup>4</sup> "HMOs and Medicare: Myths and Realities," Washington, DC: Group Health Association of America, June 1995.

Plans based on PPOs, other than catastrophic plans offered in conjunction with medical savings accounts, are not likely to benefit substantially from selection. Their market potential is likely to depend on the proportion of physicians who continue to accept new Medicare patients. A market niche may appear if low fee levels result in falling proportions of physicians willing to accept new patients in the fee-for-service Medicare program (as occurred in most state Medicaid programs as the fee levels atrophied to relatively low proportions of charge levels). Beneficiaries who wish to obtain access to physicians not available in the fee-for-service Medicare program may be willing to pay relatively high premiums to obtain such access.

Similarly, point-of-service plans offered by HMOs should not benefit as much from selection as the basic HMO options. The appeal of these plans is also likely to depend on falling physician participation rates in fee-for-service Medicare.

One serious defect in the current risk contracting arrangements would be cured by the legislation. After the first two years, enrollment would be for a full year. This would in turn reduce the potential for disenrollment selection. However, biased selection on enrollment would become even stronger. A lock-in of 15 months should reduce the appeal of the HMOs now offering zero premium plans to those beneficiaries who anticipate any possibility of a serious medical problem.

In summary, it is likely that there will be a wide range of outcomes regarding the financial experience of new managed care organizations that decide to participate in Medicare on a full-risk or partial-risk basis. Some health plans will probably experience severe financial problems due to either poor utilization management or an adverse selection of risks being enrolled. Alternatively, astute managements of new Medicare MCOs will likely find ways to attract a low-risk enrollment, control costs, and manage utilization effectively (and possibly make windfall profits in the process). As a result, projected Medicare cost savings may not be realized. However, improved HCFA

payment methods, including appropriate risk adjustment and risk sharing approaches, have the potential to minimize the effects of biased selection and, at the same time, make the Medicare managed care program attractive to new forms of managed care organizations.

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